Agilent Technologies

G2570A GC/MSD System

Installation and Operation Differences

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Document History

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Noise Declaration

Deutsch
LpA << 70 dB am Arbeitsplatz normaler Betrieb nach EN 27779:1991

English
LpA << 70 dB operator position normal operation per ISO 7779:1988

System Identification

Each of the following main components in the G2570A GC/MSD system is identified by a unique 10-character serial number:

MSD-Ready 6850A GC
Right side of the unit, lower left corner

G2629A Control Module
Back side of the unit, near center

G2577A Diffusion Pump MSD
Left side of the unit, lower right corner

Computer
Varies per model

Computer Monitor
Back side of the unit, near center

G1701CA MSD Productivity software
Registration number in Software Certificate and Registration Packet

Manual Conventions

Cautions
Cautions call attention to procedures which, if not correctly performed or adhered to, could result in *damage to the instrument*.

Warnings
Warnings call attention to procedures which, if not correctly performed or adhered to, could result in *personal injury*.

Part Numbers
In this manual, Agilent Technologies part numbers are generally listed in parentheses after the name of the part. Most part numbers are either four-digit-by-four-digit (1234-1234) numbers or five-digit-by-five-digit (12345-12345) numbers.

Safety Information

Safety Symbols (on equipment)

Refer to operating instructions

Indicates hazardous voltage

Indicates hot surface

Indicates earth (ground) terminal

Safety class
The 5973N Mass Selective Detector (MSD) is a Safety Class I instrument and has been designed and tested in accordance with IEC Publication 1010-1 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use.

WARNING
Connecting the system to a power source which is not equipped with a protective earth contact creates a shock hazard for the operator and can damage the instruments. Likewise, interrupting the protective conductor inside or outside the system or disconnecting the protective earth terminal creates a shock hazard for the operator and can damage the instruments.

WARNING
Make sure that only fuses with the required current rating and of the specified type are used for replacement. The use of incorrect or makeshift fuses or the short-circuiting of fuse holders creates a shock hazard for the operator and can damage the instrument.

WARNING
Any adjustment, maintenance or repair of the opened instrument while it is connected to a power source should be avoided if possible and, if required, should be carried out only by trained persons who are aware of the hazards involved.

Safety Information is continued on the inside of the back cover.

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1

Introduction

About this Manual

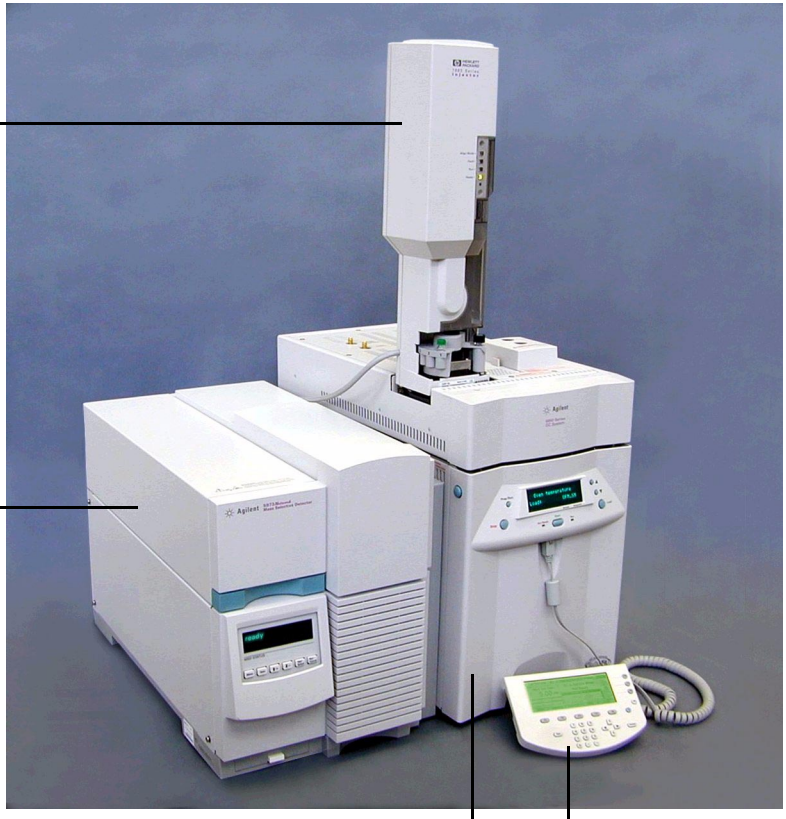
This manual describes the installation and operation procedures for the G2570A GC/MSD System *that are different* than the same activities for the individual 6850A GC and the 5973N MSD components. Successful installation and operation of the G2570A GC/MSD critically depends upon becoming familiar with information from the following sources which are included with the G2570A shipping kits:

- 6850A GC User Information (CD-ROM, Part No. G2630-90220 or newer version)
- 6850A Control Module User Information (CD-ROM, Part No. G2629-90220 or newer version) and online help
- 6850A GC Multimedia Maintenance (CD-ROM, Part No. G2630-90240 or newer version)
- 5973*Network* MSD Hardware Installation Manual (paper, Part No. G2589-90006)
- G1701CA MSD Productivity ChemStation Software Installation Manual (paper, Part No. G1701-90039)
- G1701CA MSD Software (CD-ROM, Part No. G1030-60101)
- 5973*Network* MSD Hardware Manual (Part No. G2589-90001) and online help
- 5973*Network* MSD Local Control Panel Quick Reference (paper, Part No. G2589-90011) and online help
- 5973*Network* MSD Maintenance (CD-ROM, Part No. G1030-60108)
- MSD Reference Collection (CD-ROM, Part No. G1030-60104)
- Relevant 6850A GC accessory (autosampler, valves) manuals/CD-ROM materials

For updated information, see the Agilent Technologies' Chemical Analysis Group website at www.agilent.com/chem.

Description of G2570A GC/MSD System

This section summarizes changes to the sub-systems that make up the G2570A GC/MSD System.



6850A GC/ MSD-Ready

This special configuration of the 6850A GC (firmware version A.02.04 or later) is only available as part of the G2570A GC/MSD System. The gas chromatograph has been modified as follows:

- The on/off power switch moved to the right side in the lower front corner.
- A hole pre-drilled in the left outer panel, insulation and oven wall to accommodate the GC- MS interface heater.
- The GC-MS interface heater uses the detector heated zone.
- The Injector Mounting Bracket support relocated on the right side panel.
- The GC is configured only with a split/splitless inlet containing an unpacked, single taper deactivated liner (Part No. 5181-3316).
- The use of a JetDirect card is NOT supported.
- The GC communicates with the MS only via the APG Start/Stop remote cable (Part No. G1530-60930).

6850A GC Control Module

The firmware (version E.02.10 or later) of the GC Control Module has been modified to recognize that the MSD is the only supported detector for the MSD-Ready 6850A GC.

5973*Network* MSD

The G2577A diffusion pump EI MSD is the only MSD used in the G2570A system.

ChemStation Hardware and Software

The computer hardware sub-system (applicable PC, monitor, printer, hub, and LAN cables) supports the use of one MSD. The G1701CA MSD Productivity software is the same software as is used with other 5973N MSDs.

Supported Accessories

The G2570A GC/MSD system will support the following **accessories**:

- 7683 ALS Injector (G2613A) controlled by the GC Control Module
- Valving compatible with the standard 6850A GC controlled by the GC Control Module
- High-Pressure Merlin Microseal (Part No. 5182-3442)
- Ion Gauge Controller (59864B)

Other detectors and other means for introducing samples into the split/splitless inlet are NOT supported.

Special Parts

The following parts are unique to the G2570A GC/MSD system:

- GC Instrument Base, G2630-00152
- MS Detector Plate (counterweight used in place of GC detector), G2630-20980
- GC Ship Kit, G2630-60201
- GC/MSD Interstitial Panel, G2589-00031

With frequent GC column changes, it is recommended that additional column clips (G2630-20890) be purchased.

Installation and Operation Implications for the G2570A GC/MSD System

The following table summarizes how the differences described above translate into installation and operation differences between the G2570A GC/MSD system and 6890 Plus/5973N GC/MSD systems:

Differences	Implications
Diffusion pump MSD only	Chemical Ionization not supported
	GC column flows greater than 1.5 mL/min not recommended
	GC column Ids greater than 250 μm not recommended
No direct GC - ChemStation communication	GC sections of LAN installation and configuration omitted
	Standalone MSD instrument configuration required
	GC Control Module used to input/save GC parameters only
	MSD ChemStation used to input/save MS parameters only
GC - MSD communication via remote start/stop only	Sequential start of MSD followed by GC required
No other GC detectors allowed	Ability to save GC signals via Control Module or ChemStation eliminated
	Ability to test/diagnose GC detectors via Control Module or ChemStation eliminated
MSD not attached to oven door (compared to other 6850A detectors)	Column installation more complicated
Column and inlet not pre-conditioned together	Installation specification not as aggressive as for 6890 Plus/5973N systems

2

Hardware Installation (Differences)

Purpose of Installation

The purpose of installation is to ensure that instruments and systems are correctly installed and functioning as designed, in the customer's facility. Correct installation is the first step in ensuring that instruments and systems operate reliably over their expected lifetimes. An Agilent Technologies service representative must perform the installation. This chapter details the ***installation differences*** for the sub-systems. The following documents contain the basic installation procedures:

- *Setting up your 6850* Quick Reference Guide (Part No. G2630-90230)
- 5973*Network* MSD Hardware Installation Manual (Part No. G2589-90006)
- Relevant 6850A GC accessory (autosampler, valves) manuals

Customer Responsibilities

The customer should ensure that the installation site is prepared in accordance with the specifications contained in the following documents:

- 5973*Network* MSD Site Preparation Manual (Part No. G2589-90010)
- *Site Prep Summary* as part of the 6850A User Information Manual (Part No. G2630-90220)
- G2570A GC/MSD System Site Preparation Addendum (Part No. G2589-90040)

A customer representative should be present at all times during the installation. The G2570A GC/MSD System is shipped in the following boxes:

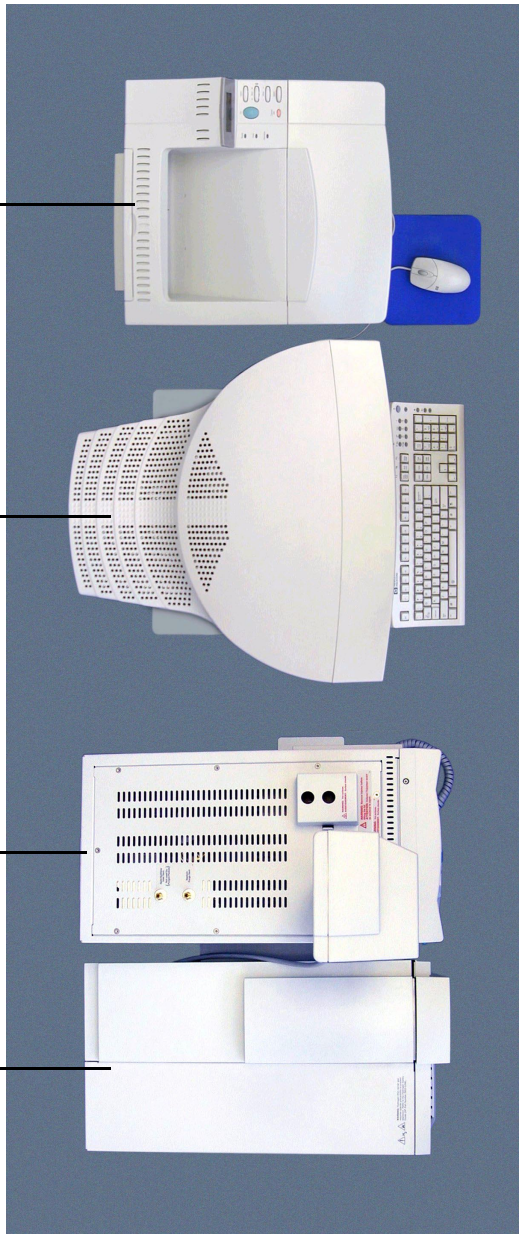
- 6850A GC - MSD-Ready
- 6850A Control Module
- 5973*N*etwork MSD
- Rough pump for MSD
- PC hardware.

Unpack and verify the contents of each container in the presence of an Agilent Technologies representative.

Check serial numbers and fill in installation documentation S/N fields if necessary.

Description	Serial Number
6850A Control Module	
6850A Gas Chromatograph	
5973N Diffusion Pump	
7683 ALS Tower (accessory)	
Ion Gauge Controller (accessory)	

- Check voltage settings of the instruments and computer systems.
- Verify that power cables are correct (must mate with power receptacles).
- Verify line voltage is correct and the correct line voltage is delivered.



Top View of Printer

Top View of ChemStation (Monitor and PC)

Top View of MSD-Ready 6850A GC

Top View of 5973N MSD

Installing the GC

1 Place the GC on the bench

2 After connecting and purging the copper tubing sections and helium gas purifier with the UPC/Zero Grade Helium carrier gas (see 5973N Hardware Installation Manual for details), attach the carrier gas line to the fitting marked "carrier gas" at the rear of the GC.

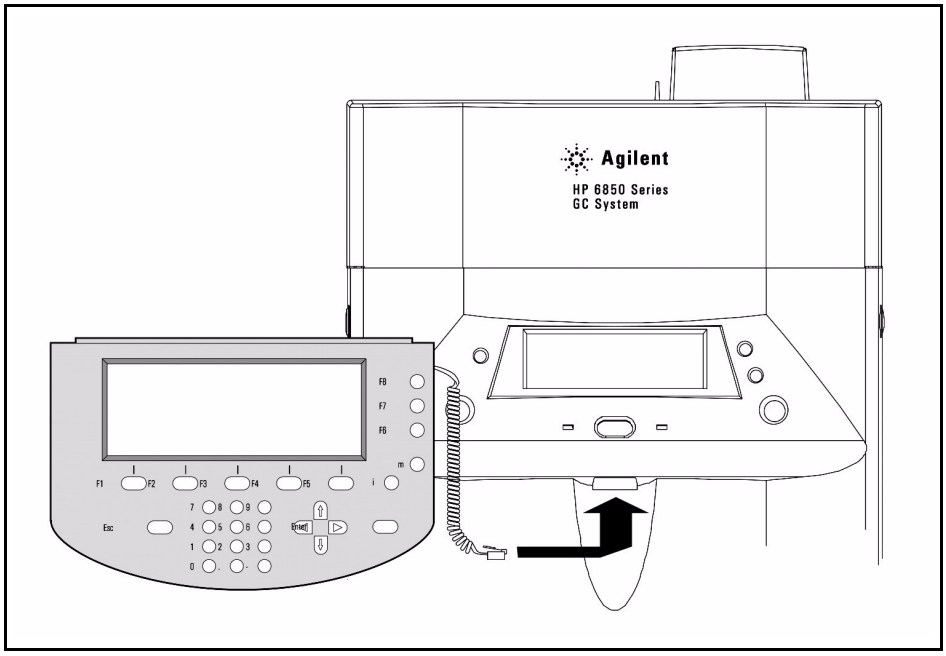
If space permits, it is suggested that the Helium gas purifier be attached with the purifier clamp to the rear portion of the right side panel.

3 Set the pressure to approximately 50 psi (345 KPa)

Make sure all connections are tight, including the septum retainer nut, liner insert weldment nut and the inlet column nut containing the ferrule plug

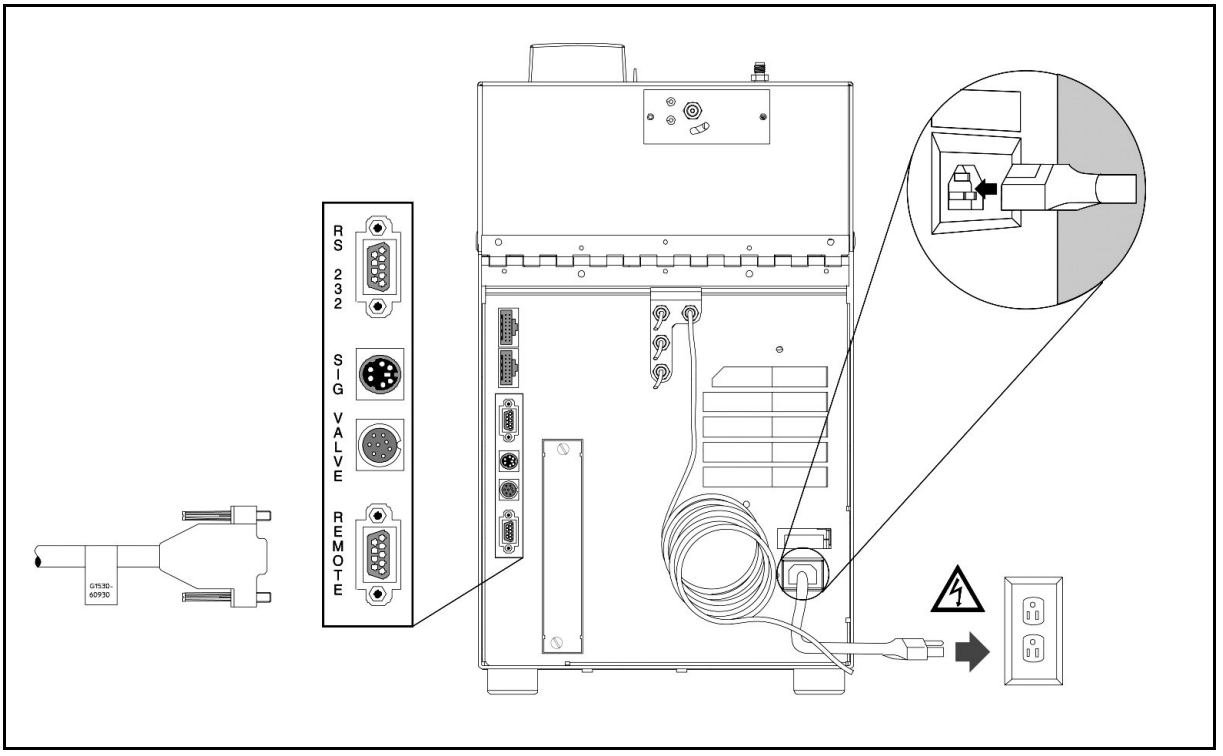
Note The 6850 GC does not ship with a column attached to the inlet.

4 Connect the Control Module to the connector below the GC Display and Keypad.



5 Connect the APG start/stop cable to the "Remote" connector on the back of the GC.

6 Connect the power cord to the GC and to the appropriate wall socket.



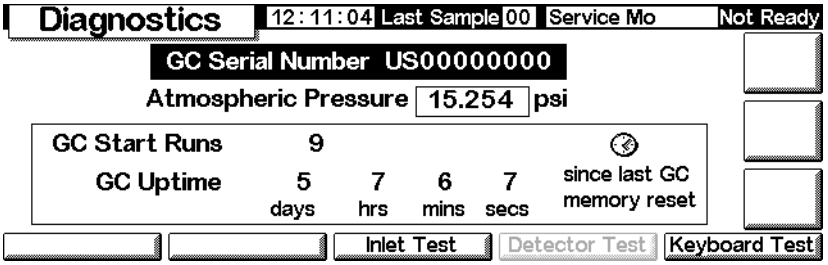
7 Turn on the power switch to the GC (located on the lower front corner of the right panel).

8 Using the Control Module, run the Inlet and Keyboard Tests.

You ***must*** become comfortable using the G2629A GC control module, especially entering values in screen fields and navigating through and between screens. See Appendix *A* for a summary of control module screens.

9 Display the Diagnostics screen via the Status/Service/Diagnostics path.

Detector Test key is inactive when the MSD is the detector.



10 Choose the Inlet Test key (F3 key).

The 6850A GC is shipped from the factory with an inlet nut containing a blank ferrule; the Leak Test and Split Vent Test is based on having a blank ferrule installed in the inlet. If you are running these tests after using the system, remember to re-install the blank ferrule before proceeding.

11 From the Inlet Test screen, perform the Leak Test (F8 key) and then perform the Split Vent Test diagnostics (F7 key), following the instructions for both tests.

Correct any inlet problems resulting from these tests before continuing.

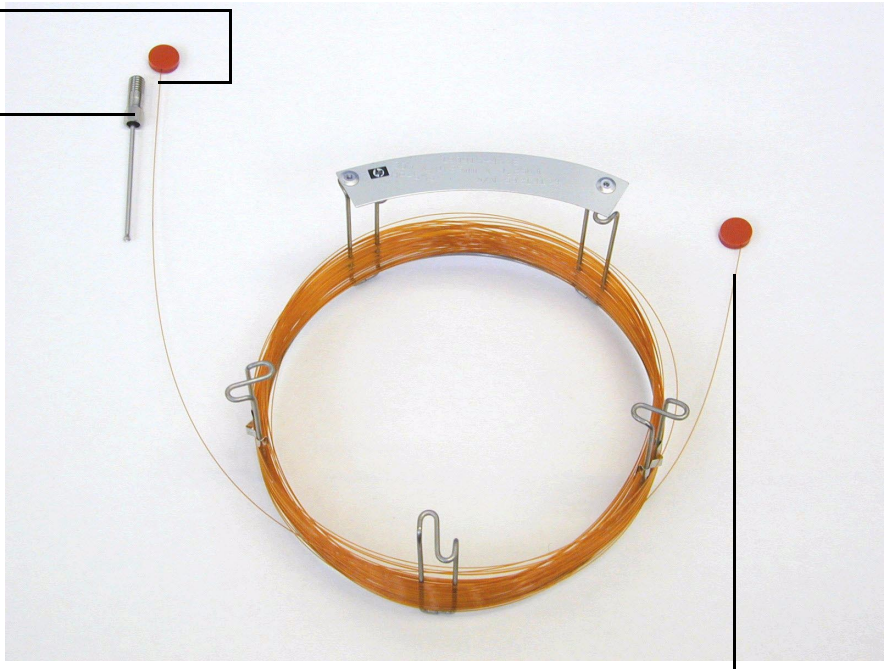
12 Run the Keyboard Test (F5 key in the Diagnostics screen) after successful completion of the Inlet Test diagnostics pass.

13 Turn off the power to the GC.

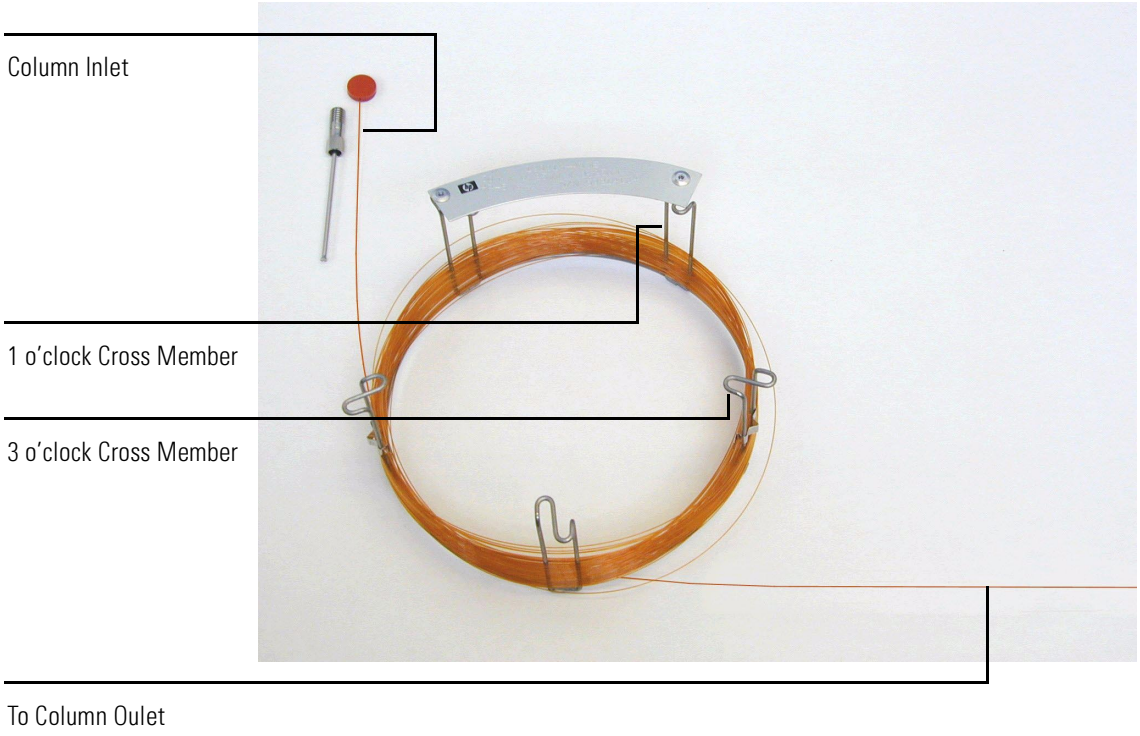
Reconfiguring the Column Outlet

The following suggested column installation procedure is based on the column label facing the user and positioned approximately at the top (12 o'clock position) of the column cage holder. With this configuration the inlet and outlet ends of the column remain the same as when a GC detector is used and the column outlet is positioned at the back (closer to the fan) of the column cage holder.

1 **Lay the column (19091S-433E found in the GC ship kit) on a clean surface with the column label facing the user in the 12 o'clock position.**



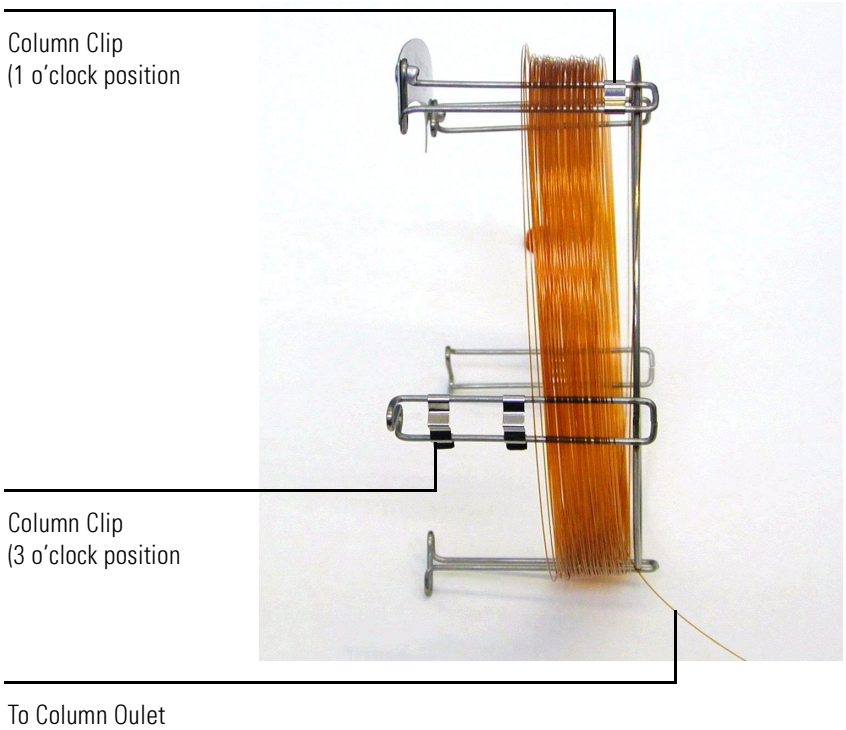
2 Remove the septum cap from the column OUTLET side and uncoil 2 column loops.



3 Attach two column clips (Part No. G2630-20890 found in the G2630-60201 Ship Kit) to the column cage as follows:

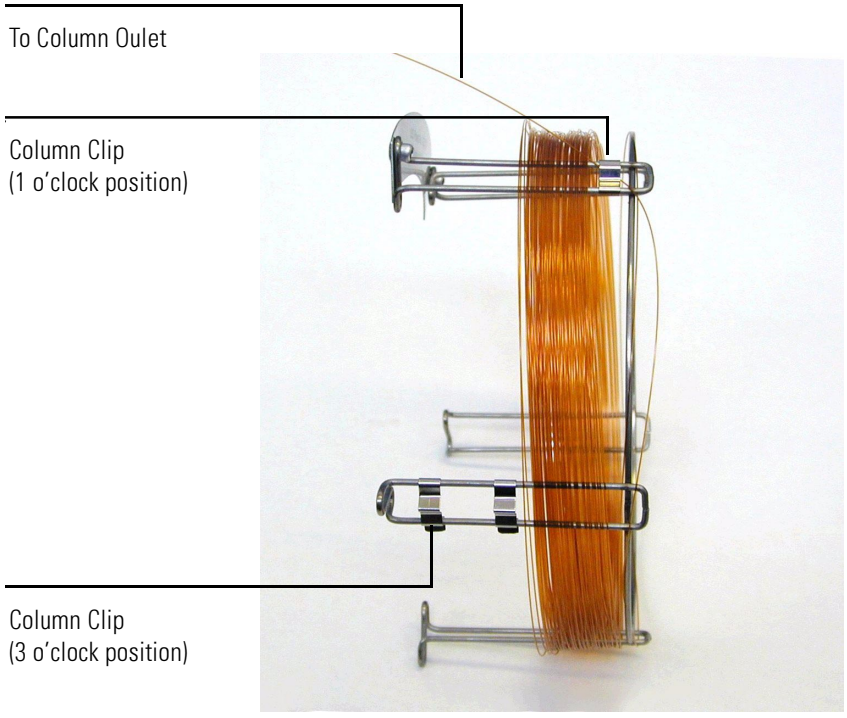
— One clip attached onto the back of the 1 o'clock cross-member piece of the column cage

— One clip attached onto the front of the 3 o'clock cross-member piece of the column cage.



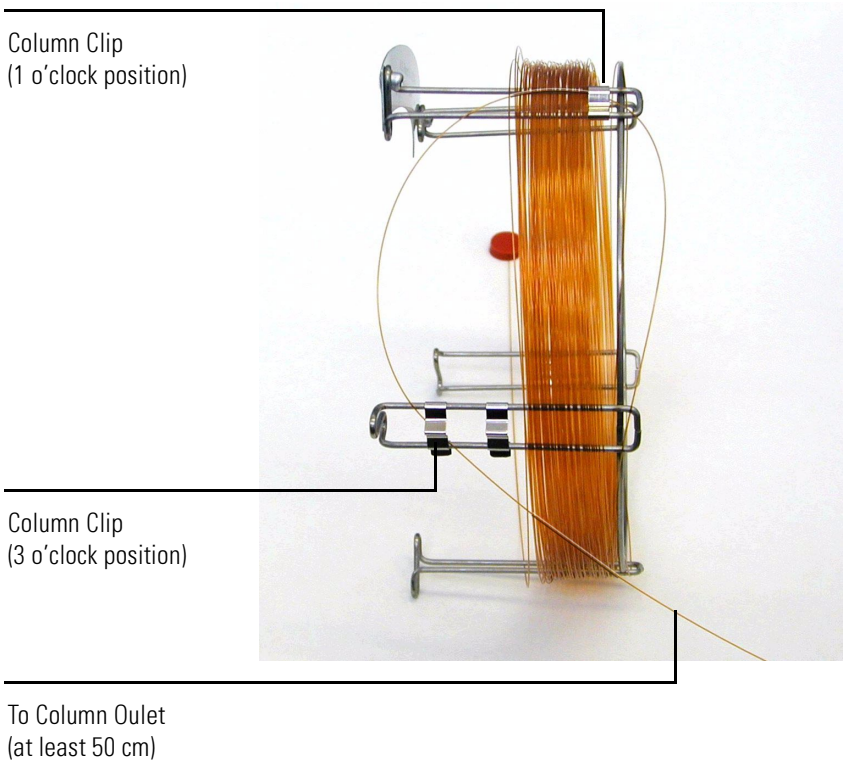
4 Feed the outlet side of the column through the 1 o'clock positioned clip so that the column outlet is pointing toward the front of the column cage.

C A U T I O N Be careful not to scratch the column coating.



5 Next, feed the outlet side of the column through the 3 o'clock positioned clip so that the column outlet is pointing toward the back of the column cage. Assure that the part of the column that is between the two clips does NOT extend above the column label.

C A U T I O N Be careful not to scratch the column coating.



There must be ***at least*** 50 cm of column between the 3 o'clock positioned clip and the outlet.

6 Carefully rewind the remainder of the column outlet around the column cage.

Installing the Column Inlet

1 **Mount the column on the cage holder with the column label in approximately the 12 o'clock position.**

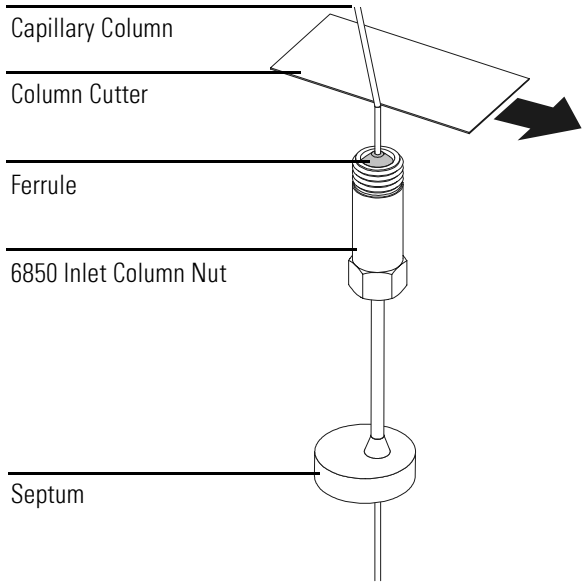
2 **Remove the septum from the column inlet.**

Proper installation of the 6850A column nut (Part No. G2630-80720) requires ***at least*** 10 cm of column inlet that can be vertically positioned without column strain. If *slight* rotation of the column cage does not yield enough column inlet length, it may be necessary to uncoil 1 loop at the inlet.

3 **Slide the septum, 6850A column nut, and ferrule (Part No. 5181-3323) onto the inlet end of the column.**

The tapered end of the ferrule should point away from the column nut.

4 **Use the column cutter (Part No. 5181-8836) to score the column 2 – 3 cm, from the inlet end.**



5 **Break off the end of the column.**

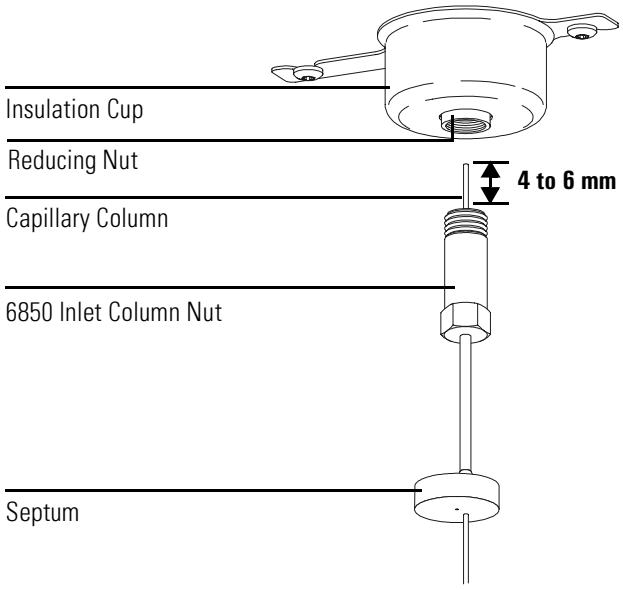
6 Inspect the end for jagged edges or burrs.

If the break is not clean and even, repeat steps 4 and 5.

7 Wipe the outside of the inlet column end with a lint-free cloth moistened with methanol.

8 Position the column so it extends 4 to 6 mm past the end of the ferrule.

9 Slide the septum so that it is even with the bottom of the column nut guide tube.



10 Insert the column nut into the inlet without letting the ferrule slip off the column and finger tighten the nut.

11 Adjust the column position so the septum is touching the bottom of the column nut guide tube.

12 Tighten the column nut an additional 1/4 to 1/2 turn (you should hear two squeaks).

The column should not slide with a gentle tug.

Preparing to Condition the Column

1 **Turn on the GC power.**

See Appendix C for the complete GC parameters for the column conditioning method, PREP_RUN.

2 **From the Setup screen select the following pathways and actions:**

- Inlet Setup - He (Carrier Gas), kPa (Units), Vacuum Correct (Adjustments)
- Oven Setup - 0.00 min (Equil Time), 320° C (Max Temp)
- Column Setup - Inlet (Source Connection), Detector (Outlet Connection)
- Column Setup/More/Configure Column/Enter - 30 m (Length), 250 um (ID), 0.25 um (Film). **Select OK (F6 key).**
- Column Setup/More/Configure Mode/Enter - Constant Flow. **Select OK (F6 key).**
- Automation - none (Valve 1), none (Valve 2)
- Automation/Auto Prep Run - Disable
- Configure/Clock Set - set date and time. Select Done.

3 **Select ESC until the Status screen is reached.**

4 **Select Status/Settings/Oven.**

Verify that the oven temp reads OFF. If needed, select the ↑ key to shut off the oven temperature.

5 **Select Inlet using the F1 key.**

6 **By using the More (F6) key, select the following pathways and actions:**

- More/Inlet Mode/Enter - Split (Mode). **Select OK (F6 key).**
- More/Pulse Mode/Enter - Normal (Mode). **Select OK (F6 key).**
- More/Gas Saver - Gas Saver (Mode), 20 mL/min (Gas Saver), 3.0 min (Gas Saver). **Select OK (F6 key).**

7 **On the Status/Settings/Inlet screen, enter 5 (mL/m) column flow and 200 (split ratio).**

8 **Cut about 1 cm from the outlet end of the GC column.**

9 Verify column flow by placing the outlet end of the column in a beaker of water and checking for bubbles at the column outlet.

Allow five minutes before applying heat to any GC thermal zone. This wait time is to purge trapped air from the column.

10 In the Status/Settings/Inlet screen, set the Inlet to 300° C.

11 In the Status/Settings/Oven screen, set the initial oven temperature to 40° C.

12 Set the following oven temperature program in the Status/Settings/Oven screen:

- 1 minute intial time
- 5° C/min ramp rate
- 280° C final temperature
- 71 minute hold in (at 280° C)
- 35° C post-run temperature

This procedure is for conditioning an HP5-MS capillary column. The temperatures of the GC thermal zones (injection port, column oven and GC/MS interface) must never exceed the upper limit specified for the column.

13 In the Status/Settings/Column screen, verify that the run time is 120 minutes.

14 In the Status /Settings/Detector screen, verify that the screen is titled "Mass Selective Detector Transfer Line" and that the message "Heater Missing" is displayed.

15 In the Status/Settings/Auxillary screen, verify that the No Auxiliary option is selected from the Auxiliary Type field.

Return to the Status Screen.

16 In the Status screen, select Method Files.

17 Verify that the method parameters are correct (see Appendix C for a complete list of PREP_RUN GC method parameters).

18 Select the Save (F8) key.

19 Save the method as PREP_RUN. These hidden characters are found sequentially using the keys 66269675.

Important To enter the name in the method file field, you ***must*** be familiar with how to access the hidden characters from the GC Control Module keypad. See Appendix B for a review of this procedure.

20 Select OK.

Conditioning the Column and Inlet System

As the column and inlet system have not been thermally cycled as a unit, it is necessary to accomplish this conditioning more slowly. ***While thermally cycling the GC, start the MSD preparation.***

1 **Once all initial temperatures have equilibrated, start PREP_RUN by selecting the START (F8) key from the Status screen in the Control Module or by selecting Start on the GC keypad.**

   While the oven is heating proceed with the MSD preparation.

2 **Once the oven temperature exceeds 80° C, inject 5 uL of methanol. Repeat 2 more times at 15 minute intervals.**

3 **When the oven temperature has cooled to 35° C (see the Status/Settings/ Oven screen), set the injection port to OFF.**

4 **When the injection port has cooled below 100° C (see the Status/Settings/ Inlet screen), turn the GC power *off*.**

Preparing the MSD for Installation

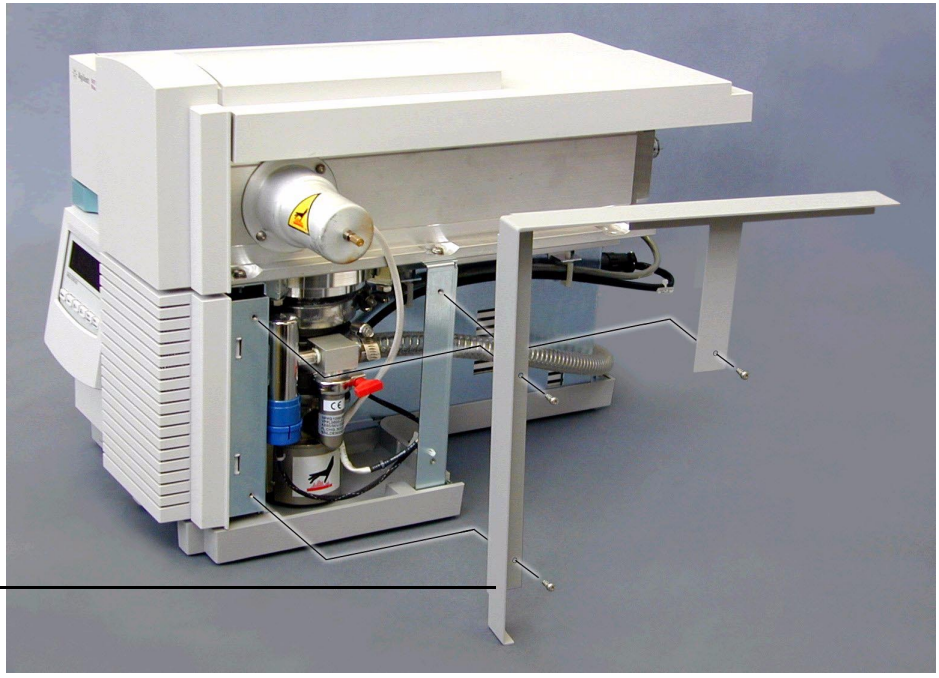
Follow the steps in Chapter 2 of the Hardware Installation Manual (Part No. G2589-90006) that apply for a diffusion pumped, EI only 5973N MSD.

C A U T I O N Make sure to remove the cap from the diffusion pump. Turning on the power to the MSD with the diffusion pump cap installed will result in serious damage to the instrument. See the instructions taped to the MSD.

Connecting the MSD and the GC

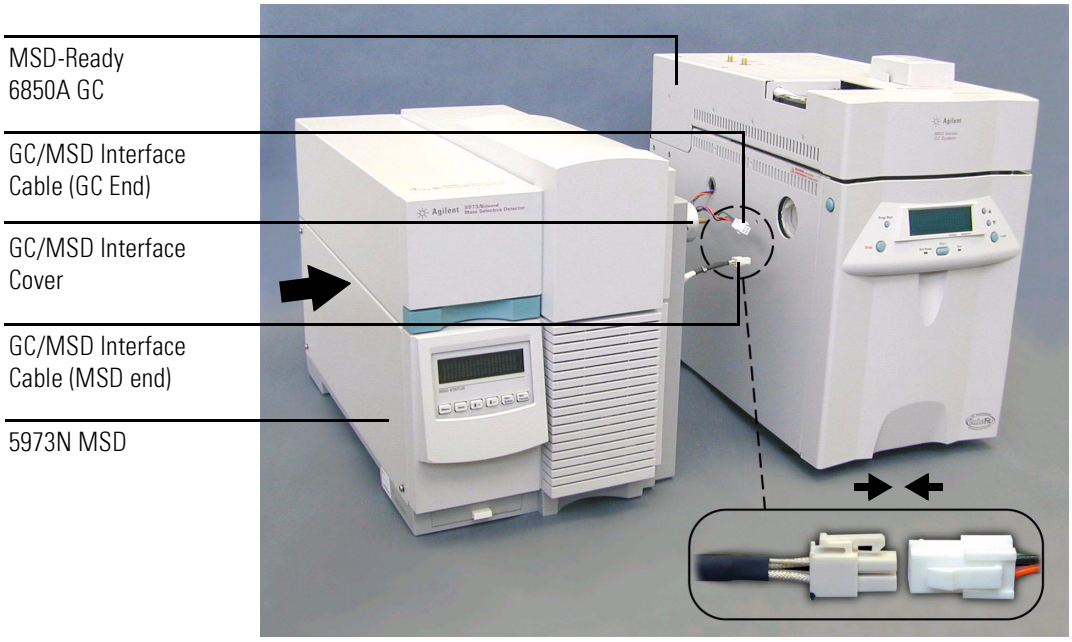
1 **Verify that the GC power is turned off.**

2 **Install the GC/MS Interstitial Panel (Part No. G2589-00031) onto the mid-support and front-support legs of the right side of the MSD. Use three M4 torque 15 screws.**



GC/MSD Interstitial Panel

3 Connect the GC end and the MSD end of the GC/MS interface cable.



4 Carefully push the MSD and GC together.

When positioned properly, the end of the GC/MS interface cover will touch the oven wall and the GC/MS interface tip will protrude slightly into the GC oven.

5 Connect the cables on the back of the MS.

— APG start/stop cable coming from the GC to the **Remote** connector
— LAN cable coming from the hub
— Rough pump power cable

6 Connect the MSD power cord to an appropriate ac outlet.

7 Remove the MSD analyzer cover.

8 Loosen the sideplate thumbscrews completely, disconnect the source power and side board control cables, and open the analyzer.

9 Remove the interface column nut and blank ferrule from the GC end of the GC/MSD interface.

Installing the Column in the GC/MSD Interface

1 ***Carefully*** **unwind the outlet end of the GC column until the 3 o'clock clip is reached.**

2 **Slide an interface column nut (Part No. 05988-20066) and ferrule (Part No. 5062-3508) onto the outlet end of the GC column.**

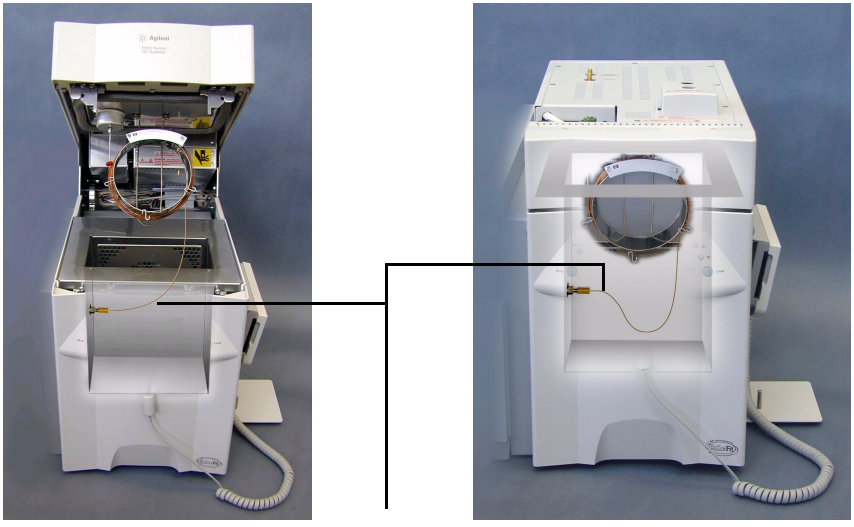
The tapered end of the ferrule must point towards the nut.

3 **Slide the column into the GC/MSD interface until the column protrudes into the analyzer chamber at least 5 cm.**

4 **Adjust the length of the column from the 3 o'clock clip to the back of the interface column nut to be 22 – 28 cm.**

5 **Hand tighten the interface nut.**

6 ***Carefully*** **close the oven door while observing to see that the column does not develop sharp bends nor touch the oven walls/floor. Try this procedure several times.**



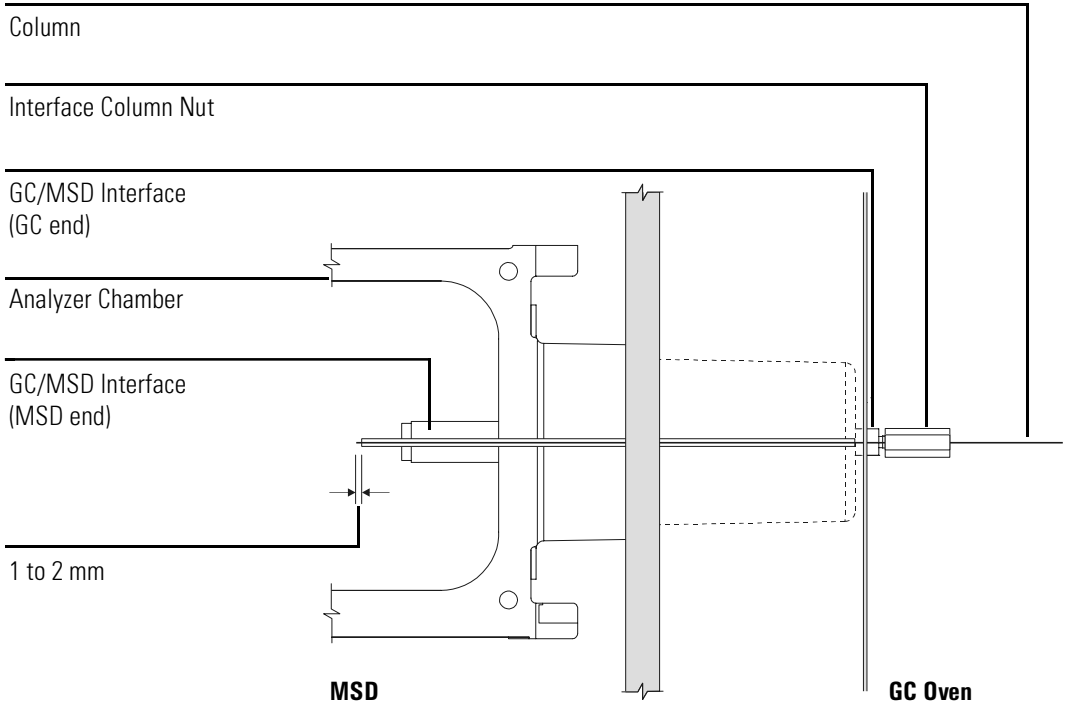
7 **Loosen the interface nut and push the column an additional 3 – 5 cm into the analyzer chamber.**

8 **Make a clean cut of the column so that now only 3 – 5 cm protrudes into the analyzer chamber.**

9 **Clean the outside of the free end of the column with a lint-free cloth moistened with methanol.**

10 **Adjust the column so that it protrudes 1 to 2 mm into the analyzer chamber past the end of the GC/MS interface, and hand tighten the nut.**

Make sure the position of the column does not change as you retighten the nut.



11 **REPEAT step 6 to assure column integrity.**

12 Tighten the interface nut an additional 1/4 to 1/2 turn with a 1/4 inch open-end wrench.

Check the tightness after one or two heat cycles.

13 If available, install the G2613A Autoinjector accessory and connect its cable to the top "Injector" port in the back of the GC. Also install the injector mounting bracket and post (found in the GC Ship Kit) next to the GC power switch.

14 Turn the GC on.

15 Verify that the injection port temperature is set to OFF (see the Status/ Settings/Inject screen).

16 **In the Status/Settings/Detector screen verify that a "Heater Missing" message is NOT displayed and that the Temperature is set to OFF.**

17 **In the Status/Settings/Inlet screen, set the column flow to 1.0 mL/m.**

18 **Reconnect the source power and side board control cables after closing the analyzer side plate.**

19 **Turn on the MSD power switch to initiate MSD pump down.**

Press on the side plate of the MSD to achieve a good seal. Verify that the foreline pump and front fan turn on and that the foreline pump stops gurgling within 60 seconds.

20 **After 5 minutes of pumping, turn off the MSD.**

21 **Reinstall the MSD analyzer cover.**

Installing the ChemStation Hardware

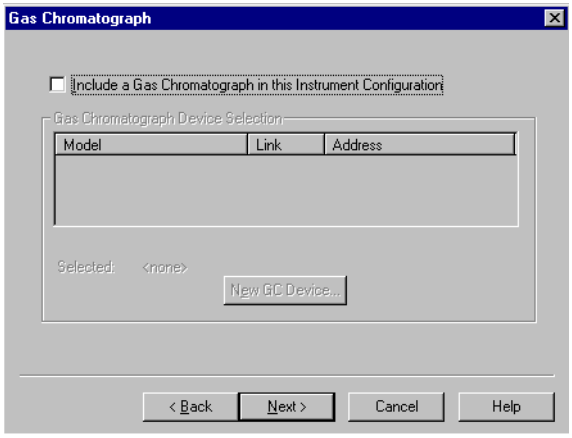
Follow the instructions in the Hardware Installation Manual (Part No. G2589-90006) ***except*** do not try to connect the GC to the LAN.

Installing the MSD Productivity Software

Follow the instructions in the G1701CA MSD Productivity Software Installation Manual (Part No. G1701-90039) keeping in mind that there is no communication between the GC and the ChemStation.

Do ***not*** perform the following steps:

- Do ***not*** attempt to connect the GC to the LAN.
- Do ***not*** attempt to add a Bootp entry for the GC.
- Do ***not*** attempt to discover the MAC address of a GC Jet Direct network card.
- When configuring an instrument in the MSD ChemStation, do ***not*** select the "*Include a Gas Chromatograph in this Instrument Configuration*" option in the Gas Chromatograph dialog box (i.e., GC is configured as "Offline").



- Do ***not*** configure the 6850 as a 6890 GC.

Any network troubleshooting tests that involve the GC are not applicable.

Verifying EI Scan System Performance

Verifying performance of the G2570A GC/MSD system involves creating and saving the GC method (OFN_SN) in addition to the steps described in the Hardware Installation Manual (Part No. G2589-90006).

The GC parameters for OFN_SN are found in Appendix D.

Preparing the MSD

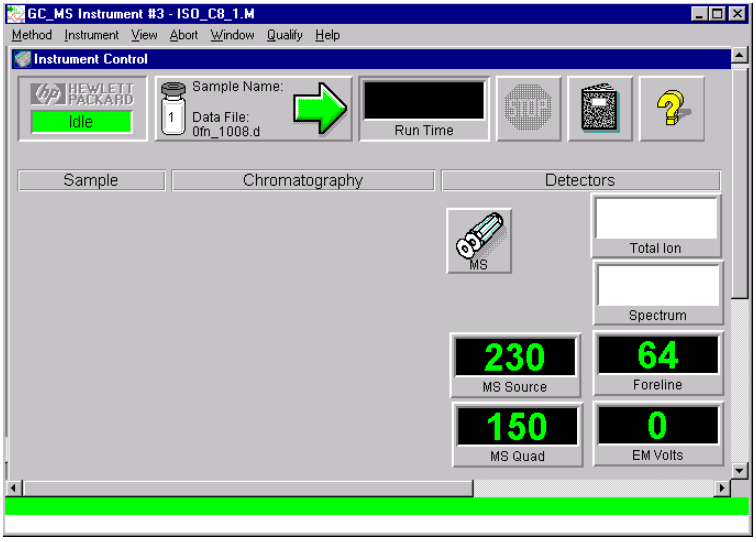
1 **Start up the MSD.**

Verify that the foreline pump and front fan turn on and that the foreline pump stops gurgling within 60 seconds.

2 **From the MSD Productivity Software, start the instrument session.**

3 **Switch to the Instrument view and verify that DEFAULT.M is the loaded method.**

4 **From the Instrument view, verify that both icons and pulldown menu items for GC parameters in the Instrument view are NOT accessible.**



5 Save the method as X:\MSDchem\1\Methods\DEFAULT.M where "X" is the drive onto which the software was loaded.

6 Load and resave X:\MSDchem\1\5973N\OFN_SN.M.

7 Verify that the source and quads are heating toward 230°C and 150°C, respectively.

8 While the MSD temperature zones are stabilizing, create the OFN_SN GC method.

Creating the GC Method (see Appendix D)

1 In the Status/Settings/Detector screen, set the MSD Transfer Line Temperature to 280° C.

This procedure is for an HP5-MS capillary column. The temperatures of the GC thermal zones (injection port, column oven and GC/MS interface) must ***never*** exceed the upper limit specified for the column.

2 If the G2613A Autoinjector accessory is to be used, select the Status/ Setup/Automation pathway and verify that the correct Injector Turret Size (1 or 8 sample) is displayed.

- Select the Injector (F1) key
- Select Injector Fan "on"
- Select Syringe uL "10" (must match the volume of the syringe in the Autoinjector)
- Select "Waste Bottle "Use bottle A only"
- Place a wash bottle with clean iso-octane in position A
- Place an empty waste bottle in the correct position

3 Verify that the other Status/Setup parameters are the same as in the PREP_RUN method (see Appendix D).

4 Starting at the Status/Settings screen, select the following pathways and actions:

- Inlet - 250° C (Temperature)
- Inlet/More/Inlet Mode/Enter - Splitless (Mode), 50 mL/min (Flow), 1.50 min (Time) Select OK
- Inlet/More/Pulse Mode/Enter - Pulsed (Mode), 172 kPa (Pressure), 1.50 min (Time) Select OK
- Inlet/More/Gas Saver/Enter - Gas Saver (Mode), 20 mL/min (Flow), 3 min (Time) Select OK
- Oven - 50° C (Initial Temperature), 1 min (Initial Time), 25°C/min (Temperature Ramp), 200° C (Final Temperature), 0 min (Final Time), 70° C (Postrun Temperature)
- Column - 1.2 mL/m (Flow)
- Detector - 280° C (Temperature)

5 If injecting manually, go to the Status/Automation screen and verify that "none" is selected for the Sequence Type.

6 If the Autoinjector will be used, go to the Status/Automation screen and verify the following settings:

1(First Vial), 1 (Last Vial), 1 (# Inj per vial), Injector (Sequence Type), no repeat (Repeat Sequence)

7 Starting at the Status/ Automation screen, select the following pathways and actions:

- Injector - 4 (Plunger Pumps), 1.0 uL (Sample Size), 0 sec (Viscosity Delay), off (Slow Plunger)
- Injector/Washes - 2 (Sample Washes), 4 (Solvent A Post Washes)
- Injector/Depth Offset - off (Enable Offset)
- Injector/Dwell Times - 0 min (Pre-Dwell), 0 min (Post-Dwell)

8 In the Status/Method Files screen, verify that all of the method parameters are correct.

9 Select the Save (F8) key and save the method as OFN_SN. These hidden characters are found sequentially using the keys 525975.

Verifying the AutoTune Performance

1 **Verify that the system has been pumping down for at least 60 minutes.**

2 **Using the GC Control Module, set the GC oven temperature to 150° C and the column flow to 1.0 mL/min.**

3 **In the Instrument Control view, select Qualify / Checkout Tune.**

The software will perform an autotune and print out the report.

4 **When the AutoTune has completed, save the method and then select Qualify / Tune Evaluation.**

The software will evaluate the last autotune and print a System Verification - Tune report.

Note The system may fail the water background tests. All other tests should pass.

5 **From the GC Control Module reload OFN_SN from the Status/Method Files/GC Methods screen by highlighting the method and selecting the Load (F8) key.**

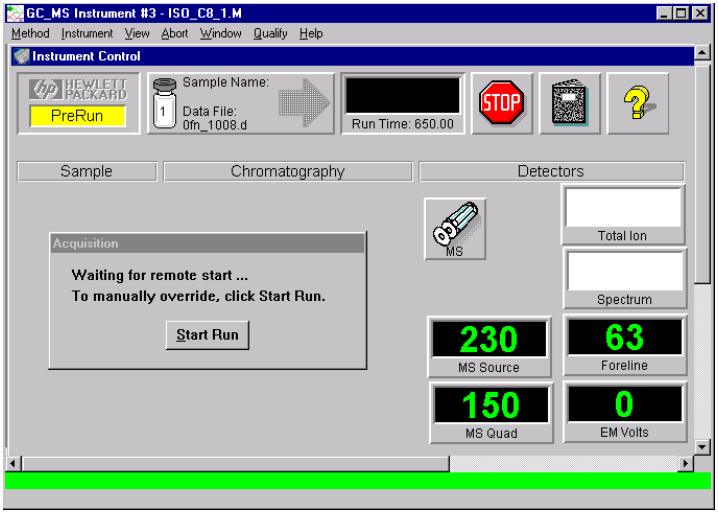
Do not save the modified parameters to this method.

Verifying the Sensitivity Performance

1 **Set up to inject 1 uL of OFN solution (Part No. 8500-5441), either manually or with the Autoinjector.**

2 **In the Instrument Control view, select *Sensitivity Check* from the Qualify menu.**

Verify that the **Waiting for remote start ...** status box appears on the monitor.



3 **If injecting manually, wait for the Not Ready light on the GC Display to turn off (may have to select *Prep Run* on the display first), inject the 1 uL sample quickly, withdraw the syringe immediately, and press *Start* on the GC Display.**

4 **If injecting with an Autoinjector, load the sample into a sample vial, place the vial in turret position 1, and press *Start* on the GC Display.**

5 **Verify that the Run Time Clock (Instrument view of the MSD Software) is displaying and updating the elapsed time.**

6 **At the end of the analysis, verify that both the GC and MS have finished.**

When the method is completed, an evaluation report should be printed out.

7 **Verify that the RMS signal-to-noise ratio meets the published specification for the G2570A system operated.**

Installation Checklist

- ☐ **Verification that Site Preparation is complete**
  - ☐ Adequate space is available for the GC/MSD/Data system
  - ☐ Suitable supporting bench
  - ☐ Adequate electrical power is available at the correct voltages and frequencies
  - ☐ Environmental control systems are adequate to maintain a correct, stable operating environment
  - ☐ Adequate preparations are in place for safe exhaust venting
  - ☐ Supplies necessary for instrument operation are available, including solvents, carrier gas, and printer paper
  - ☐ Conveniently located telephone

☐ Unpacking and inspecting the shipped materials

- ☐ Shipping containers must be opened only with an Agilent Technologies representative present
- ☐ Check each item off on the packing list and verify serial numbers
- ☐ Record the serial numbers in the G2570A installation document
- ☐ Retain shipping containers and material until contents are checked for completeness and instrument performance is verified
- ☐ Notify the distribution center of any missing or damaged items
- ☐ Shipment damaged or incomplete

Distribution Center Notified (date)

Person Contacted

DM Notified (date)

Carrier Notified (date)

Damaged or Missing Material:

☐ GC/control module installation and plumbing

- ☐ GC placed on an appropriate bench
- ☐ GC Control Module connected
- ☐ Carrier gas supply plumbed with copper tubing
- ☐ Plumbing purged with helium at 5 – 8 psi (35 – 55 kPa) for 5 – 10 minutes
- ☐ Gas purifier plumbed and purged
- ☐ GC plumbed
- ☐ APG start/stop cable connected to "Remote" plug
- ☐ Carrier gas line pressure set to 50 psi (345 kPa)

☐ GC configuration

- ☐ GC plugged in and turned on
- ☐ GC passes self test
- ☐ GC Control Module passes self test
- ☐ GC passes inlet test
- ☐ Control Module passes keyboard test
- ☐ GC power off

☐ Column outlet reconfiguration

- ☐ Place column on clean surface
- ☐ Uncoil 2 loops from outlet end of column
- ☐ Attach 2 clips onto the 1 o'clock and 3 o'clock column cage cross piece members
- ☐ Feed outlet end of column through 1 o'clock positioned clip
- ☐ Pass outlet end of column through 3 o'clock positioned clip
- ☐ Rewind remainder of column outlet around column cage

☐ Column installation

- ☐ Remove inlet nut containing blank ferrule
- ☐ Mount column on cage holder
- ☐ Remove inlet septum
- ☐ Place septum, inlet nut, and ferrule onto column inlet
- ☐ Trim column inlet, inspecting for jagged edges and burrs
- ☐ Wipe end with lint-free cloth moistened with methanol
- ☐ Position column end 4 – 6 mm past end of ferrule
- ☐ Slide septum up to maintain this position
- ☐ Insert nut into inlet
- ☐ Tighten with wrench 1/4 to 1/2 turn past finger tight

☐ Column conditioning

- ☐ GC power on
- ☐ Column flow rate set to 5 mL per min (split ratio set to 200)
- ☐ Helium flow through column verified
- ☐ GC Control Module used to create and save PREP_RUN method parameters
- ☐ Run PREP_RUN method
- ☐ 5 uL of methanol injected when oven temperature at 80° C; repeated twice at 15 minute intervals
- ☐ Injection port temperature turned off when oven cools to 35° C
- ☐ GC power off when injection port cools below 100° C

☐ MSD configuration

- ☐ MSD and foreline pump unpacked and placed on the bench
- ☐ MSD top cover removed
- ☐ Vent valve opened to equalize pressure
- ☐ PFTBA cal valve vial filled
- ☐ Plugs removed from the foreline pump
- ☐ Foreline pump line voltage verified to match available ac power
- ☐ Line voltage identification sticker installed on MSD
- ☐ Oil drip pan placed under foreline pump
- ☐ Foreline hose connected to the pump
- ☐ Pump exhaust vented to a fume hood or the oil trap installed
- ☐ Diffusion pump cap removed
- ☐ Foreline pump power cord plugged into MSD
- ☐ 59864B Ion Gauge Controller installed (accessory)

☐ GC/MSD connection

- ☐ Interstitial panel installed
- ☐ GC/MS interface cable connected
- ☐ MSD positioned with interface nut in GC oven
- ☐ APG start/stop cable from GC connected to the **Remote** port
- ☐ MSD power cord plugged into appropriate socket
- ☐ Sideplate thumbscrews loosened *completely*; analyzer opened
- ☐ Blanking interface nut removed

☐ Column (outlet end) installation

- ☐ Column unwound up to 3 o'clock clip
- ☐ Interface nut and ferrule slid onto column
- ☐ Column inserted through interface into source
- ☐ Length of column from 3 o'clock clip to interface nut adjusted to 22 – 28 cm.
- ☐ Interface nut hand tightened
- ☐ Oven door raised/closed several times to assure no sharp bends nor hot spots
- ☐ Interface nut loosened and column pushed 3 – 5 cm further into source
- ☐ Column cut to assure 22 – 28 cm length in oven
- ☐ Column end cleaned with lint-free cloth moistened with methanol
- ☐ Column positioned so 1 – 2 mm extends beyond interface towards chamber
- ☐ Interface nut tightened
- ☐ Column integrity tested again by lowering/raising oven door
- ☐ Install Autoinjector accessory and injector mounting bracket, if available
- ☐ GC powered on
- ☐ MSD Interface Temperature screen (Status/Settings/Detector) active and temperature set to OFF
- ☐ Column flow set to 1.0 mL/min at the Status/Settings/Inlet screen
- ☐ Inlet and oven temperatures set to OFF
- ☐ MSD powered on (press on the sideplate)
- ☐ Foreline pump and the front fan operation verified
- ☐ Foreline pump stops gurgling within 60 seconds verified
- ☐ MSD powered off after 5 minutes of pumping down

☐ ChemStation Hardware Installation

- ☐ PC, monitor, and printer unpacked
- ☐ PC installed
- ☐ Network hub unpacked and plugged in
- ☐ LAN cable from the MSD connected to hub port #2
- ☐ LAN cable from the PC connected to hub port #3
- ☐ Printer installed
- ☐ Modem installed (if supplied)
- ☐ Modem, printer, monitor, and PC turned on (in that order)

☐ MSD Productivity Software Installation

(See G1701CA Software Installation Manual)

- ☐ Windows NT 4.0 operating system prerequisites verified
- ☐ Service Pack 4 installed
- ☐ Modem configured with Carbon Copy (optional)
- ☐ TCP/IP installation/configuration verified
- ☐ HP I/O Libraries installed
- ☐ HP I/O Libraries configured for LAN Client
- ☐ CAG Bootp server installed from MSD ChemStation software CD
- ☐ Bootp entry added for MSD instrument (not for GC)
- ☐ MS IP address can be recognized by Bootp server
- ☐ SICL drivers installed from the MSD ChemStation software CD
- ☐ SICL drivers configured
- ☐ MSD ChemStation software installed
- ☐ MSD IP address set from MSD ChemStation Configuration program (do not configure nor include a GC)
- ☐ Firmware drivers downloaded to the LAN/MS Control card

☐ Performance Verification

- ☐ MSD powered on
- ☐ MSD Instrument session started
- ☐ Verify that GC icon and parameters are NOT accessible
- ☐ Save DEFAULT.M
- ☐ Load and resave OFN_SN.M from the \5973N subdirectory
- ☐ MSD source and quad temperature zones heating
- ☐ OFN_SN GC method created and saved using the GC Control Module
- ☐ Correct injection mode (manual or autoinjector) set in Status/Automation screen
- ☐ System pumped down for at least 60 minutes
- ☐ GC oven set to 150° C and the column flow to 1.0 mL/min
- ☐ Checkout Tune performed
- ☐ Tune Evaluation performed
- ☐ OFN_SN GC method reloaded without saving changes
- ☐ OFN sample (1 pg/uL) ready
- ☐ Sensitivity Check method selected from MSD ChemStation
- ☐ Ready to Inject status box appears in MSD ChemStation screen
- ☐ Sample injected manually or with autoinjector
- ☐ MSD start signal received from GC start
- ☐ MSD stop signal received when GC stops
- ☐ EI Sensitivity performance verified

☐ **Instrument Log Book Updated**

- ☐ MSD serial number recorded on S/N report
- ☐ S/N Report and Tune Report faxed to CAS/CSBU Technical Marketing at (USA) 650-857-4568 or your region's local Technical Marketing Support Provider

MSD-Ready 6850A GC Serial Number

6850A Control Module Serial Number

5973N MSD Serial Number

7683 ALS Autoinjector (accessory) Serial Number

EI S/N (RMS)

Customer Familiarization Checklist

The purpose of customer familiarization is to demonstrate the steps required to:

- Perform a basic analysis using an Agilent Technologies standard sample or an internal data file
- Evaluate the acquired data
- Perform routine maintenance

See the Hardware Installation Manual (Part No. G2589-90006) for a list of topics ***not*** included in familiarization.

☐ Hardware Overview

- ☐ MSD
- ☐ Gas Chromatograph
- ☐ GC Control Module
- ☐ Autoinjector (if applicable)
- ☐ PC hardware and peripherals

☐ System Operation

- ☐ Switching on instruments, PC, and peripherals
- ☐ Starting WindowsNT and using online help
- ☐ Starting MSD ChemStation software

☐ MSD ChemStation Software Overview

Software configuration of the MSD demonstrated
Different Quantitation packages and how to switch between them demostrated
Views and menu structure demonstrated

☐ MSD ChemStation Software Autotune Descriptions

- ☐ Various autotunes described
- ☐ Importance of retaining tuning records emphasized
- ☐ Ion source contamination, diagnosis of contamination, and use of control charts discussed
- ☐ EI autotune demonstrated and tune report explained
- ☐ Manual tune explained
- ☐ View Tunes utility demonstrated and its importance explained
- ☐ Importance of retaining tuning and maintenance records discussed

☐ Methods

- ☐ Edit and save GC and MSD Interface method parameters demonstrated with OFN_SN using the GC Control Module
- ☐ Explaining the absence of GC detector related information on the GC Control Module
- ☐ Edit and save MSD parameters demonstrated with OFN_SN using the ChemStation
- ☐ Explaining the absence of GC parameters with the ChemStation

☐ Data Acquisition

- ☐ Analytical method developed to run both scan and SIM
- ☐ Steps involved in starting an acquisition (MS, then GC).
- ☐ File designated to sort the data; data file naming demonstrated
- ☐ MS acquisition parameters saved as part of a method
- ☐ Use Scan/SIM (amu range 50 – 700 / ion 272) on OFN for acquisition

☐ Data Analysis

- ☐ Screen layout explained (TIC, spectral window, command line, title bar, etc.)
- ☐ Loading data files demonstrated
- ☐ TIC, spectra, and extracted ion profiles demonstrated
- ☐ Integration performed and explained
- ☐ Library search (searching a spectrum) demonstrated
- ☐ Difference between standalone and online data analysis explained

☐ Sequence

- ☐ Sequence loading demonstrated
- ☐ Sample Log Table editing demonstrated
- ☐ Sequence saving demonstrated
- ☐ Sequences using the GC Control Module demonstrated
- ☐ Sequence limitations (active GC method only, pause, unpause, stop) explained

☐ MSD ChemStation Maintenance

- ☐ Directory structure and maintenance of MSDchem files discussed
- ☐ Data backup options discussed
- ☐ Use of WindowsNT DEFRAG and SCANDISK utilities discussed

☐ GC Instrument User Maintenance

- ☐ GC inlet flows and parts replacement described
- ☐ Column configuration, installation and maintenance described
- ☐ Messages and routine maintenance as shown in the GC Users Manual demonstrated
- ☐ Service Mode in the GC Control Module demonstrated

☐ **EI Instrument User Maintenance**

- ☐ MSD vent and pumpdown procedures performed and described using the ChemStation software
- ☐ Hardware manual, online help, and hardware maintenance section of *MSD Reference Collection* CD-ROM demonstrated
- ☐ Ion source cleaning demonstrated
- ☐ Electron multiplier horn replacement demonstrated
- ☐ Vacuum system preventive maintenance demonstrated

☐ **Troubleshooting (Diagnostics)**

- ☐ Tune charts under Qualify menu demonstrated
- ☐ Online help for troubleshooting demonstrated
- ☐ Diagnostics in the GC Control Module explained

☐ **Remote Operations/ Modem setup (if applicable)**

- ☐ Carbon Copy demonstrated
- ☐ System configuration described
- ☐ Calling out discussed

☐ **Tune Charts**

- ☐ Displaying results explained
- ☐ Ion source parameters explained
- ☐ Mass Filter parameters explained

☐ Additional Support Information

- ☐ Use of manuals, online help, and MSD Reference Collection CD-ROM explained
- ☐ Warranty and warranty enhancements explained
- ☐ Agilent support services and how to obtain help explained
- ☐ Hardware
- ☐ Software
- ☐ Assist Packages
- ☐ Additional Training
- ☐ Consulting

Company Name

Customer Signature/Date

Engineer Signature/Date

Sales Order Number

3

Operational Differences

Introduction

This section of the manual describes the operational procedures of the G2570A GC/MSD System ***that are different*** when compared to the same procedures for the individual system components. Successful operation of the G2570A GC/MSD critically depends upon becoming familiar with information from the following sources which are included with the G2570A shipping kits:

- 6850A GC User Information (CD-ROM, Part No. G2630-90220 or newer version)
- 6850A Control Module User Information (CD-ROM, Part No. G2629-90220 or newer version) and online help
- 6850A GC Multimedia Maintenance (CD-ROM, Part No. G2630-90240 or newer version)
- 5973*N*etwork MSD Hardware Installation Manual (Part No. G2589-90006)
- G1701CA MSD Productivity ChemStation Software Installation Manual (Part No. G1701-90039)
- G1701CA MSD Software (CD-ROM, Part No. G1030-60101)
- 5973*N*etwork MSD Hardware Manual (Part No. G2589-90001) and online help
- 5973*N*etwork MSD Local Control Panel Quick Reference (Part No. G2589-90011)
- 5973*N*etwork MSD Maintenance (CD-ROM, Part No. G1030-60108)
- MSD Reference Collection (CD-ROM, Part No. G1030-60104)
- Relevant 6850A GC accessory (autosampler, valves) manuals

For updated information, see the Agilent Technologies' Chemical Analysis Group website at http://www.agilent.com/chem.

Operational differences between the G2570A GC/MSD system and a 6890 Plus GC/5973N diffusion pump system are affected by the following hardware differences:

- The mounting of the column cage onto the oven door significantly alters column installation procedures.
- The control of the GC oven temperature and GC/MSD interface temperature locally by the GC Control Module modifies MSD pumpdown and venting procedures.
- The control of all GC parameters (including GC/MSD interface temperature) locally by the GC Control Module changes how method and sequence parameters are edited.
- The communication between GC and MSD only by an APG start/stop cable changes how methods and sequences are run.
- Only the split/splitless inlet is supported.
- Means for introducing samples into the split/splitless inlet other than by manual injection or autoinjection (G2613A) are not supported
- No other detectors (including no second GC/MSD) are supported.
- The GC ChemStation software is not supported on the G2570A data system.

Important

You ***must*** become comfortable using the G2629A GC control module, especially entering values in screen fields and navigating through and between screens. See Appendix *A* for a summary of control module screens.

Installing GC columns

Before you can operate your G2570A GC/MSD system, you must select, install and condition a GC column. For correct column and flow selection, you must match your choice with the capabilities of the diffusion pump supplied with the G2570A system.

Optimal helium gas flow with this diffusion pump is 1 milliliter per minute. While higher flows can be used, the maximum recommended flow is 1.5 mL/min. Above this helium flow rate, spectral performance and sensitivity will be degraded.

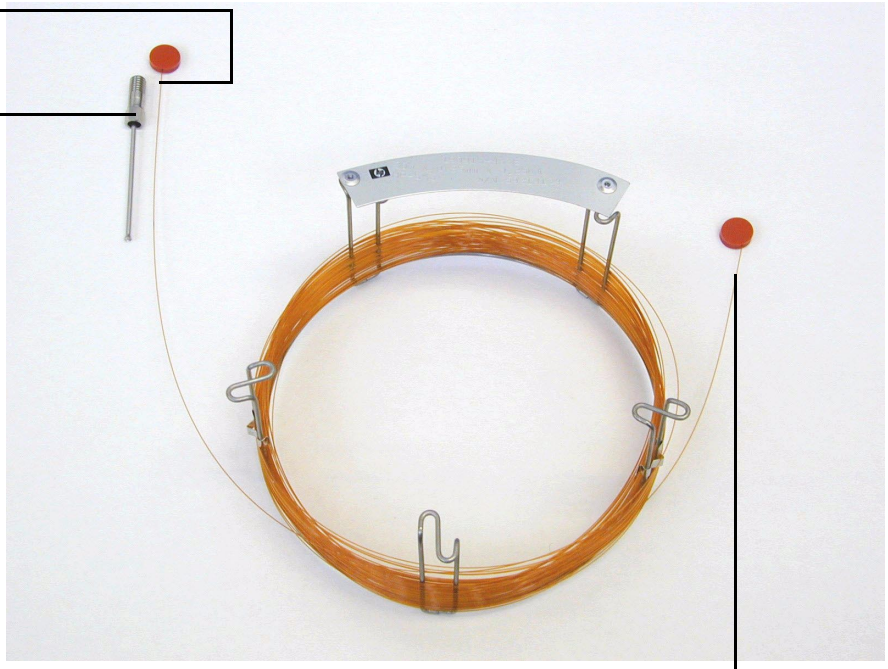
The vacuum system will shut down at approximately 2 mL/min. Based on this information, it is recommended that the maximum column id be 250 um.

C A U T I O N If the G2613A Autoinjector accessory is used with the G2570 GC/MSD system, do not leave the Autoinjector on top of the GC when opening the oven door. The extra weight on top of the 6850A oven lid could cause the lid to close unexpectedly. The Autoinjector can be stored temporarily by placing it on the injector mounting bracket, attached to the right panel of the 6850A GC.

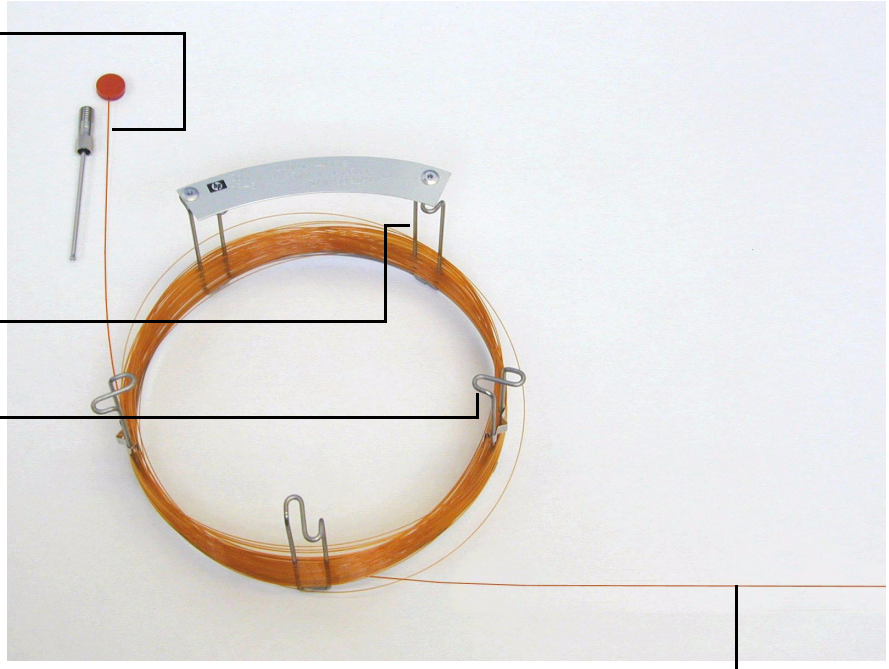
Reconfiguring the Column Outlet

The following suggested column installation procedure is based on the column label facing the user and positioned approximately at the top (12 o'clock position) of the column cage holder. With this configuration the inlet and outlet ends of the column remain the same as when a GC detector is used, and the column outlet is positioned at the back (closer to the fan) of the column cage holder.

1 **Lay the column on a clean surface with the column label facing the user in the 12 o'clock position.**



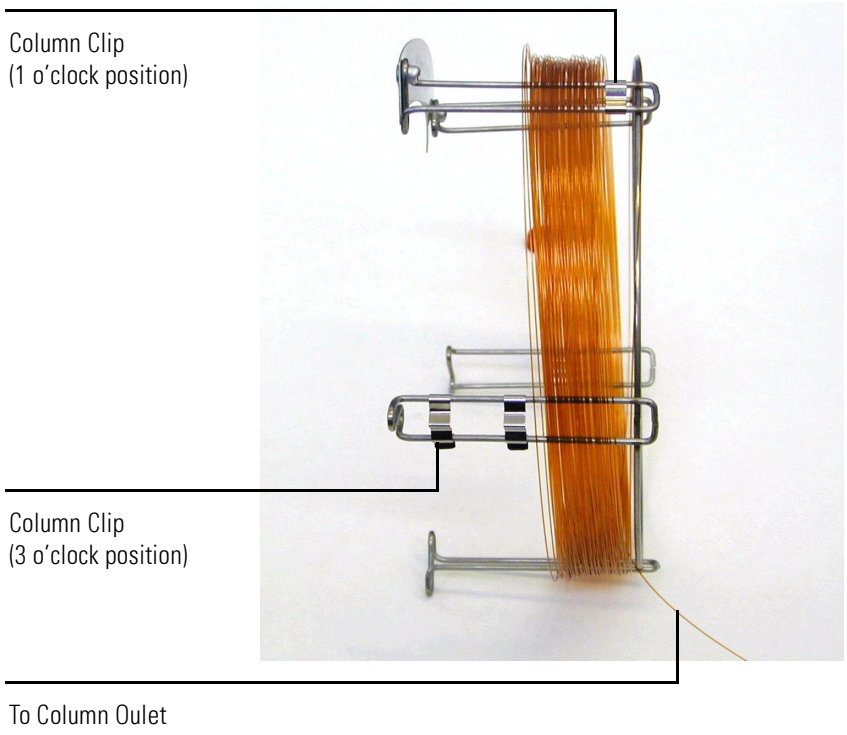
2 Remove the septum cap from the column OUTLET side and uncoil 2 column loops.



3 Attach two column clips (Part No. G2630-20890) found in the G2630-60201 Ship Kit to the column cage as follows:

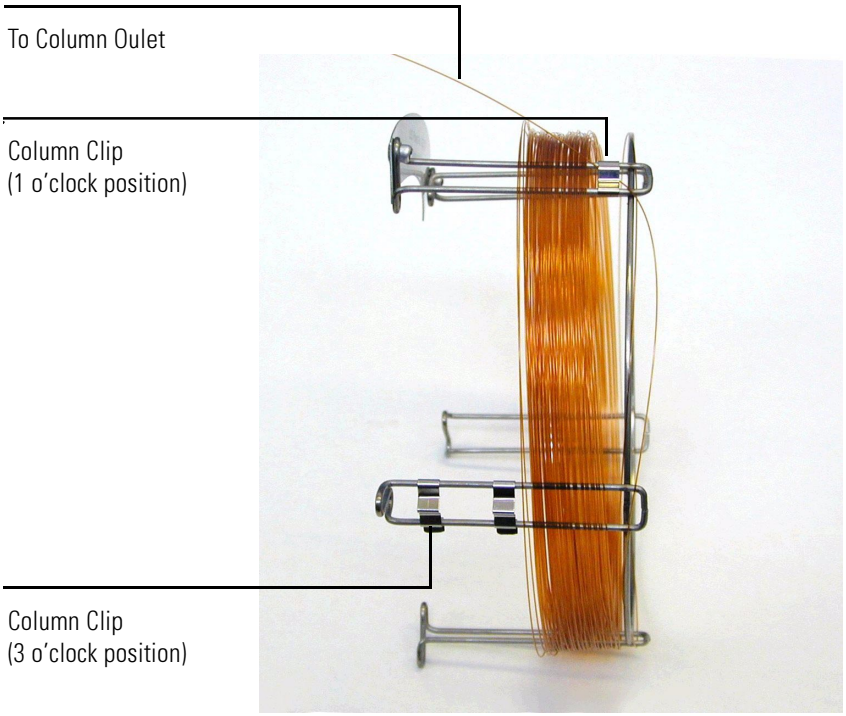
— One clip attached onto the back of the 1 o'clock cross-member piece of the column cage

— One clip attached onto the front of the 3 o'clock cross-member piece of the column cage



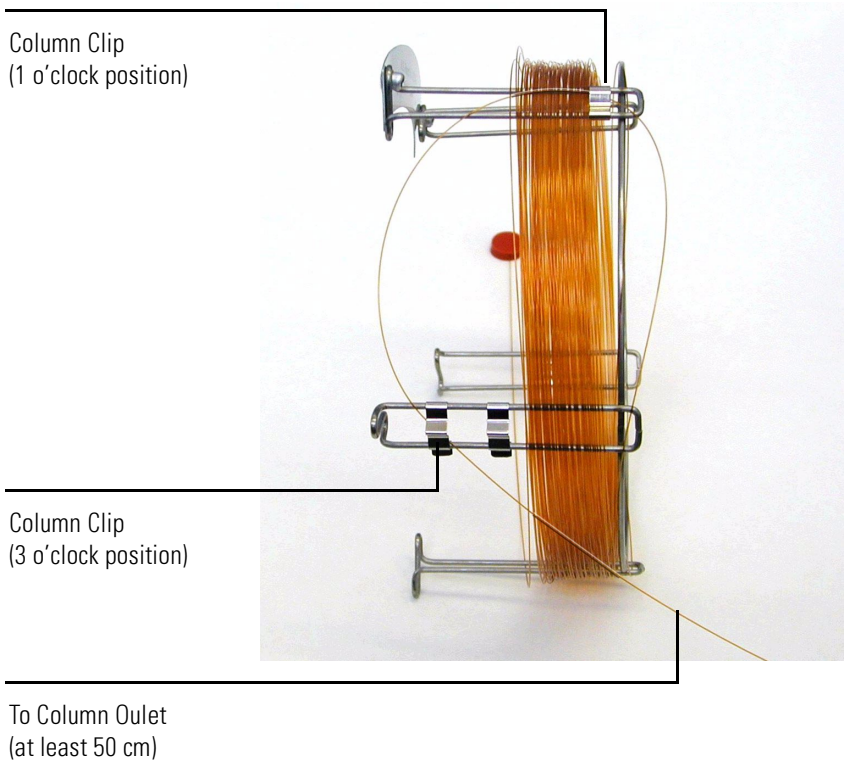
4 Feed the outlet side of the column through the 1 o'clock positioned clip so that the column outlet is pointing toward the front of the column cage.

C A U T I O N Be careful not to scratch the column coating.



5 Next, feed the outlet side of the column through the 3 o'clock positioned clip so that the column outlet is pointing toward the back of the column cage. Make sure that the loop height does NOT extend above the column label.

C A U T I O N Be careful not to scratch the column coating.



There must be ***at least*** 50 cm. of column after it passes through the 3 o'clock positioned clip.

6 Carefully rewind the remainder of the column outlet around the column cage.

Installing the Column Inlet

C A U T I O N At this point the MSD has been properly vented, all GC heated zones (inlet, oven, and MSD interface) have been cooled below 75° C, and the column flow has been set to OFF.

1 Mount the column on the cage holder with the column label in approximately the 12 o'clock position.

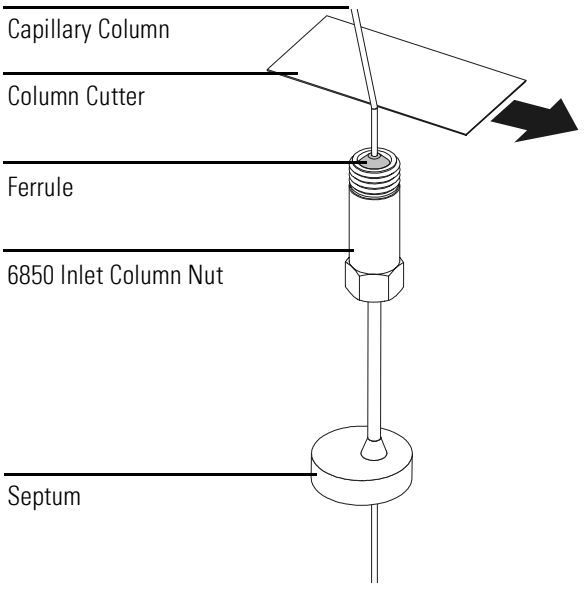
2 Remove the septum from the inlet end of the column.

Proper installation of the 6850A column nut (Part No. G2630-80720) requires ***at least*** 10 cm of column inlet that can be vertically positioned without column strain. If ***slight*** rotation of the column cage does not yield enough column inlet length, it may be necessary to uncoil 1 loop at the inlet.

3 Slide the septum, column nut (Part No. G2630-80720) and appropriately sized GC inlet ferrule onto the inlet end of the column.

The tapered end of the ferrule should point away from the column nut.

4 Use the column cutter (Part No. 5181-8836) to score the column 2 – 3 cm, from the inlet end.



5 **Break off the end of the column.**

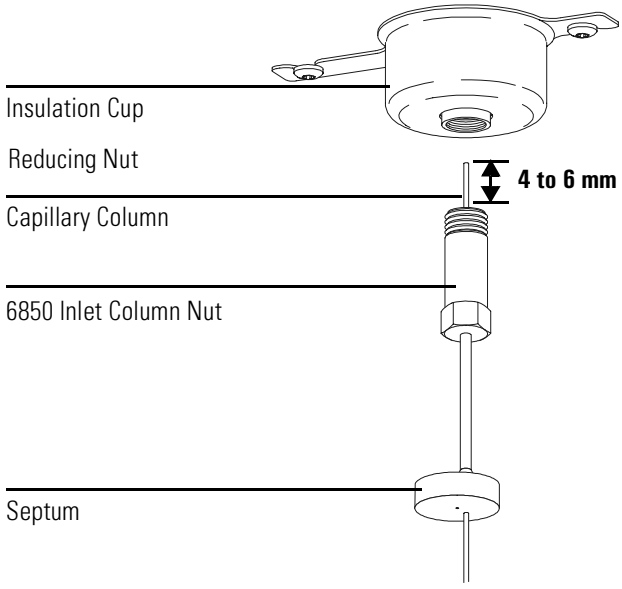
6 **Inspect the end for jagged edges or burrs.**

7 **If the break is not clean and even, repeat steps 4 and 5.**

8 **Wipe the outside of the inlet column end with a lint-free cloth moistened with methanol.**

9 **Position the column so it extends 4 to 6 mm past the end of the ferrule.**

10 **Slide the septum so that it is even with the bottom of the column nut guide tube.**



11 **Insert the column nut into the inlet without letting the ferrule slip off the column and finger tighten the nut.**

12 **If needed, adjust the column position so the septum is touching the bottom of the column nut guide tube.**

13 **Tighten the column nut an additional 1/4 to 1/2 turn.**

14 The column should not slide with a gentle tug.

15 Allow five minutes before applying heat to any GC thermal zone. This wait time is to purge trapped air from the column.

Do NOT install the outlet side of the column into the GC/MS interface until the column is properly conditioned.

Conditioning the column

1 **Using the GC Control Module, load prep_run.m or a similar column conditioning method with GC parameters appropriate for the column to be used.**

   Make sure that the MSD interface temperature is set to ***off*** during column conditioning.

2 **With carrier gas flow through the column, check the inlet column nut for leaks. Tighten as needed.**

3 **Program the oven temperature slowly (5° C per minute) to 10° C above your highest analytical temperature.**

   Do ***not*** exceed the upper temperature limit recommended for the column.

4 **Once the oven temperature exceeds 80° C, inject 5 uL of methanol.**

5 **Repeat step 4 two more times at 15 minute intervals.**

6 **Hold the oven temperature at the upper limit for several hours.**

7 **Return the GC oven temperature to a low standby value.**

Venting/pumping down the MSD

Since the only communication between the MSD-ready 6850A GC and the MSD is via the remote start/stop cable, the ChemStation will ***not*** turn off the interface heater or lower the GC oven temperature during the venting process. Thus, you must lower these two thermal zone temperatures using the GC Control Module.

Similarly, the MSD interface and GC oven temperatures must be reset using the GC Control Module during pump down.

Installing the Column in the GC/MS Interface

1 **If the GC/MSD system is under vacuum, vent the system and open the analyzer chamber using the procedure in the 5973N MSD Hardware Manual (Part No. G2589-90001).**

2 ***Carefully*** **unwind the detector end of the GC column until the 3 o'clock clip is reached.**

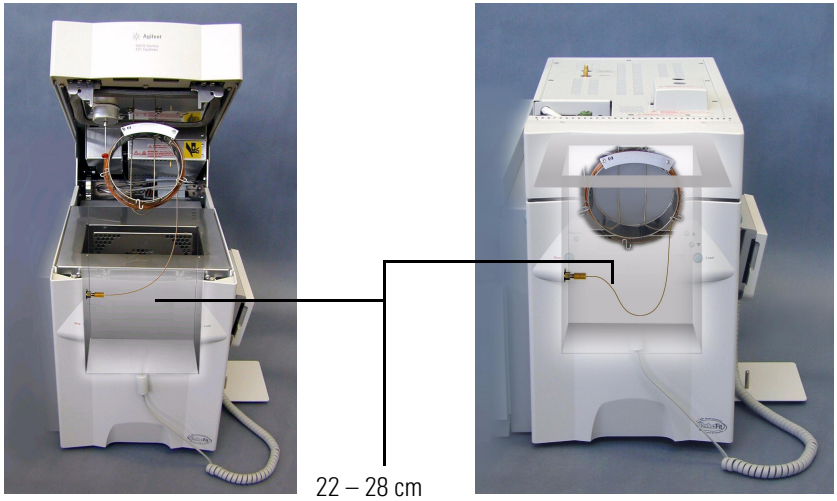
3 **Slide an interface column nut (Part No. 05988-20066) and appropriately sized GC/MSD interface ferrule onto the detector end of the GC column.**
The tapered end of the ferrule must point towards the nut.

4 **Slide the column into the GC/MS interface until the column protrudes into the analyzer chamber at least 5 cm.**

5 **Adjust the length of the column from the 3 o'clock clip to the back of the interface column nut to be 22-28 cm.**

6 **Hand tighten the interface nut.**

7 ***Carefully*** **close the oven door and make sure the column does not develop sharp bends nor touch the oven walls/floor. Try this several times.**



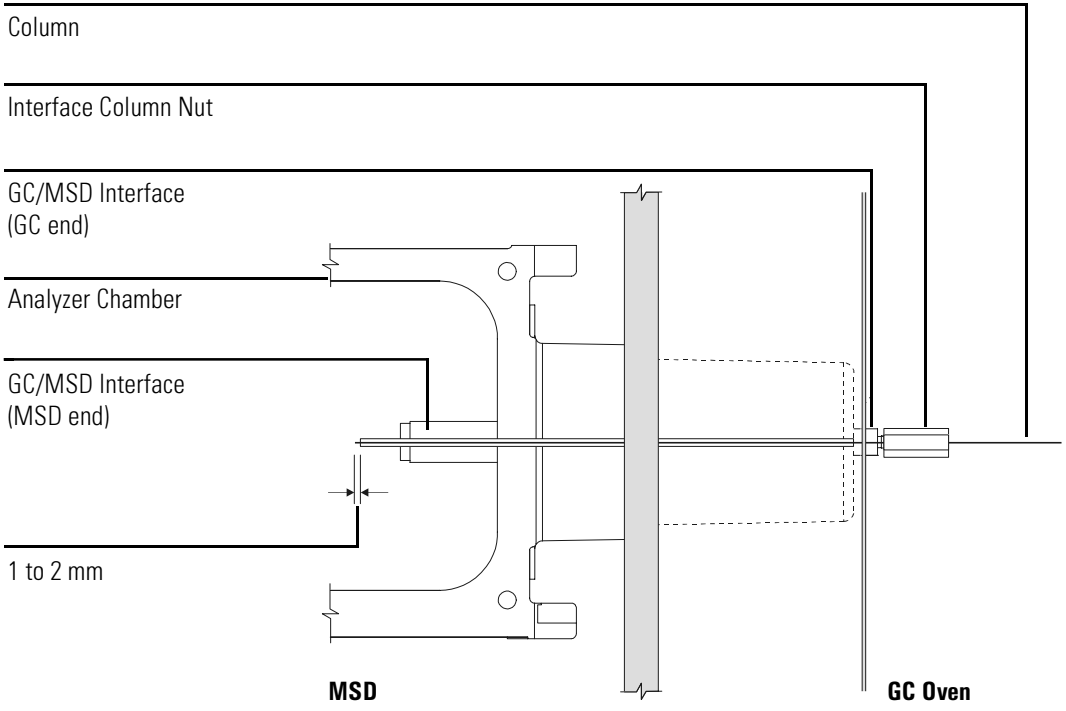
8 **Loosen the interface nut and push the column an additional 3-5 cm into the analyzer chamber.**

9 **Make a clean cut of the column so that now only 3-5 cm protrudes into the analyzer chamber.**

10 **Clean the outside of the free end of the column with a lint-free cloth moistened with methanol.**

11 **Adjust the column so that it protrudes 1 to 2 mm into the analyzer chamber past the end of the GC/MS interface, and hand tighten the nut.**

Make sure the position of the column does not change as you retighten the nut.



12 **Repeat step 7 to assure column integrity.**

13 Tighten the interface nut an additional 1/4 to 1/2 turn with a 1/4 inch open-end wrench.

14 Check the tightness after one or two heat cycles.

15 In the Status/Settings/Inlet screen, set the column flow to the appropriate value for the column installed.

16 Pump Down the MSD following the instructions in the 5973N MSD Hardware Manual (Part No. G2589-90001).

Press on the side plate of the MSD to achieve a good seal. Verify that the foreline pump and front fan turn on and that the foreline pump stops gurgling within 60 seconds.

17 When prompted, set the MSD interface temperature using the GC Control Module (Status/Settings/Detector screen).

18 Reinstall the MSD analyzer cover.

Creating GC/MSD Methods

GC Control Module

Configuring the MSD Productivity Software for operation with the G2570A system requires that you do ***not*** include a GC. All GC parameters, including the MSD interface temperature, are set with the GC Control Module.

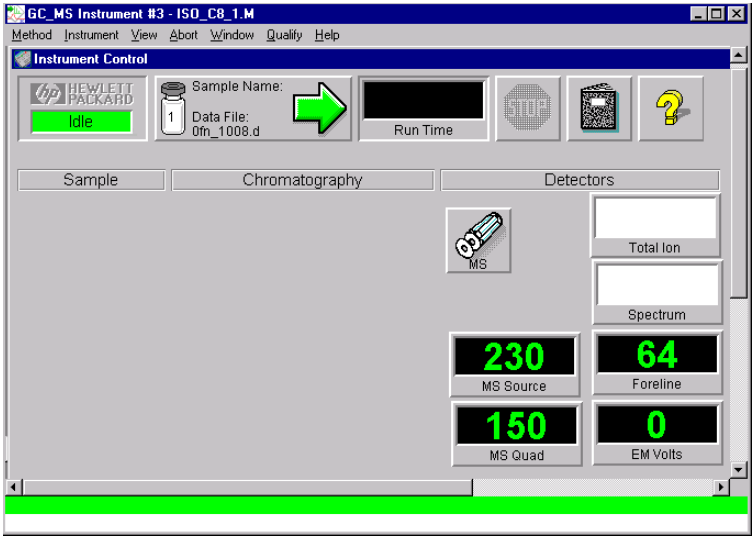
IMPORTANT

You ***must*** become comfortable using the G2629A GC control module, especially entering values in screen fields and navigating through and between screens. See Appendix *A* for a summary of control module screens.

To enter the name in the method file field, you ***must*** be familiar with how to access the hidden characters from the GC Control Module keypad. See Appendix B for a review of this procedure.

Instrument Control View

In the Instrument Control View of a GC/MSD session using the G2570A system, both icons and pulldown menu items for GC parameters will be inaccessible. When loading a method that was shipped as part of the ChemStation software, always resave the method before using it.



When choosing to Edit Entire Method, no GC parameters will be accessible.

Run Time

The run time for the MSD will always be 650 minutes. Data acquisition time is dictated by the start and stop signals sent by the GC.

Manual injection

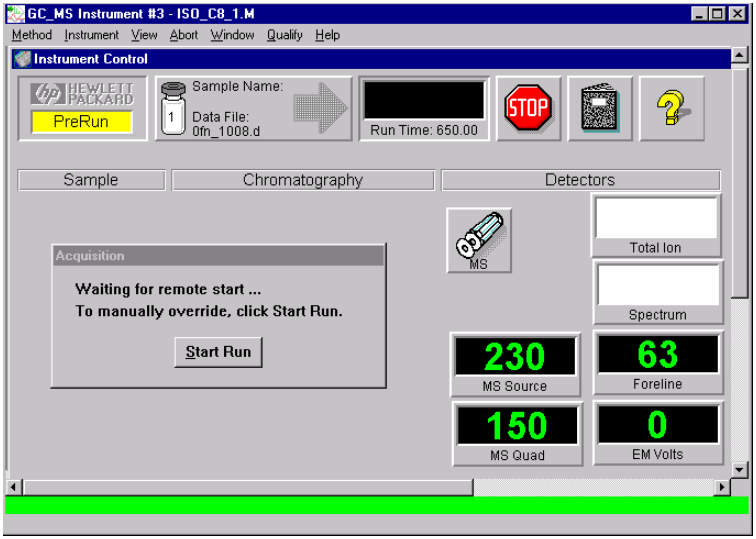
Manual injection can be performed with or without an autoinjector connected to the GC. The autoinjector can be bypassed by:

- Selecting **None** in the Sequence Type field of the Status/Automation screen in the GC Control Module, and
- Placing the autoinjector onto the injector mounting bracket located at the right side of the GC.

The Status screen of the GC Control Module should now be titled **Manual Run Status**.

Important

Running a sample using the G2570A GC/MSD system *requires* that you start the MSD acquisition process before starting the GC. The GC start signal must not be initiated until the **Acquisition - Waiting for remote start...** status box appears on the ChemStation monitor screen. Selecting the Start Run button in this status box is unnecessary and will result in incorrect retention times.



After initiating the method on the MSD ChemStation, data acquisition after a manual injection can be started by:

- Pressing **Start** on the GC keypad, or
- Pressing the **START** key (F8) in the Status screen of the GC Control Module.

If Auto Prep Run is not enabled in the method, it may be necessary to select **Prep Run** in the GC keypad to set the GC to the Ready condition.

Data acquisition can be stopped before the end of the method by:

- Pressing **Stop** on the GC keypad, or
- Pressing the **STOP** key (F7) in the Status screen of the GC Control Module.

When data acquisition is stopped before the end of the run, the MSD ChemStation will save the data file.

Automatic injection

When using the G2613A Autoinjector accessory with the G2570A GC/MSD system, up to eight samples can be sequentially injected. While the data for each sample may be acquired and analyzed using different mass spectral parameters, all samples in a sequence ***must*** be injected and chromatographed using the same GC parameters.

The parameters selected in the Status/Automation screen (injector/valve parameters, clock table, events table, and sequence sample list) are ***not*** saved with the method. Before automatically injecting a sample or sequence of samples, check to see if the automation parameters are correct.

IMPORTANT

Running a single sample or a sequence of samples using the G2570A GC/MSD system ***requires*** that you start the MSD acquisition process before starting the GC. The GC start signal must not be initiated until the **Acquisition - Waiting for remote start...** status box appears on the ChemStation monitor screen. Selecting the "Start Run" button in this status box is unnecessary and will result in incorrect retention times.

To acquire data from a single injection of a single sample

1 Load the autoinjector with wash and waste bottles placed in the correct places in the turret.

2 Place the sample in position 1 in the turret.

3 Load the MSD method from the ChemStation and the GC method from the Control Module.

4 Set the appropriate injector parameters (accessed from the Status/ Automation screen).

5 In the Status/Automation screen, set the following sequence parameters:

- First Vial to 1
- Last Vial to 1
- # Inj per Vial to 1
- Sequence Type to Injector
- Repeat Sequence to no repeat

6 Start the MSD method from either the ChemStation or the MSD Local Control Panel.

7 After the "Waiting for remote start ..." status box appears, start the GC method by:

- Pressing the Start button on the GC Keypad, or
- Pressing the START key (F8) in the Status screen of the GC Control Module, or
- Pressing the START key (F8) in the Status/Automation screen of the GC Control Module.

To stop data acquisition before the end of the method

- Press the Stop button on the GC Keypad, or
- Press the STOP key (F7) in the Status screen of the GC Control Module.

Pressing either the Stop Seq key (F7) or PAUSE key (F6) in the Status/ Automation screen will not stop data acquisition as these two keys allow the run to be completed.

When data acquisition is stopped before the end of the run, the MSD ChemStation will save the data file.

To acquire data from multiple injection sequences

1 **Make sure that the proper turret is installed to accommodate the number of samples.**

The standard turret will hold a maximum of 3 samples while the high density turret will hold up to 8 samples.

2 **Load the autoinjector with wash and waste bottles placed in the correct places in the turret.**

3 **Place the samples in their appropriate places in the autoinjector turret.**

4 **Load the first MSD method from the ChemStation and the GC method from the Control Module.**

5 **Set the appropriate injector parameters (accessed from the Status/ Automation screen of the GC Control Module).**

6 **Set the appropriate sequence parameters in the Status/Automation screen of the GC Control Module.**

7 **Create the MSD Sample Log Table consistent with entries consistent with the GC sequence parameters (# sample vials, # injections per vial, and if sequence repeats).**

8 **Save the MSD Sequence.**

9 **Start the MSD SEQUENCE from either the ChemStation or the MSD Local Control Panel.**

10 **After the "Waiting for remote start ..." status box appears, start the GC method by**

- Pressing the Start button on the GC Keypad, or
- Pressing the START key (F8) in the Status screen of the GC Control Module, or
- Pressing the START key (F8) in the Status/Automation screen of the GC Control Module.

11 Sequence execution can be paused by pressing the PAUSE key (F6) in the Status/Automation screen. If a run is in progress, the GC will complete the run and then pause the sequence.

After the current run is completed, the MSD ChemStation will initiate the next line in the Sample Log Table even if the GC sequence is paused. The ChemStation will then wait for a start signal from the GC.

12 Sequence execution can be resumed by pressing the PAUSE key again.

As the next line in the MSD Sample Log Table has been initiated, there is no need to select Position and Run from the MS Top view.

13 The paused sequence can be canceled by pressing the Stop Seq key (F7) in the Status/Automation screen.

To cancel the MSD sequence, press ABORT in the MS TOP view.

14 An active sequence can be stopped by pressing the Stop Seq key (F7) in the Status/Automation screen. If a run is in progress, the GC will complete the run and then stop the sequence.

— A stopped sequence cannot be resumed.

— To cancel the MSD sequence, press ABORT in the MS Top view.

15 An active run and sequence can be stopped by pressing the Stop button on the GC Keypad or the STOP key (F7) in the Status screen.

To cancel the MSD sequence, press ABORT in the MS Top view.

Appendix A

Summary of Navigation on 6850A GC Control Module (from the Status screen)

F1: Settings

F1 – Inlet	F2 – Oven	F3 – Column	F4 – Detector	F5 – Auxiliary
Temperature, Pressure, Flows, Puse mode, Gas saver, Split or splitless mode	Temperature setpoints, Temperature ramps/ program	Pressure ramp, Flow ramp, Column control mode, Column config	GC/MSD Interface Temperature	Temperature setpoint

F2: Automation – Sequence type, Samples used, Sequence repeat, Sequence control

F1 – Injector	F2 – Valves		F4 – Clock Table	F5 – Run Table
Volume, Pumps, Washes, Depth, Dwell, Viscosity, Slow plunger	Toggle valves		Add and delete event	Add and delete event

F3: Method Files – View current method, Save current, revert to default method

			F4 – PC Card	F5 – GC Methods
			Load method, Delete method, Save method on card	Load method, Delete method

F4: Setup – Column comp information, Start column comp run

F1 – Inlet Setup	F2 – Oven Setup	F3 – Column Setup	F4 – Automation	F5 – Configure
Carrier gas, Pressure units, Vacuum correct	Equilibrium time, Max temp, Cryo control	Source connection, Outlet connection, Column config, Control mode.	Injector, Valves, Auto prep run	Data comm., Display, Mfg. Data, Clock, Local UI, Beeps, Locks

F5: Service – Run log, start service, exit service

F1 – Log Book	F2 – Diagnostics	F3 – Calibration	F4 – GC Update	F5 – Mod Update
Log book	Inlet, Keyboard	Oven, Inlet, Column	Update GC Firmware	Update Control Module firmware

Appendix B

Naming Methods

The GC Control Module keys have both labeled and hidden values (see table below). To name a method with alphanumeric characters:

1 **Move the cursor to the left end of the Method Name field.**

2 **Press the proper labeled key (see table below) multiple times to reach the hidden values. If you go too far, keep pressing to return to the proper value (values loop).**

3 **Move the cursor to the next character in the method name using the → key. To change a character, scroll using the ← key.**

4 **Do NOT add an extension to the method name.**

Key Label	Hidden Characters
1	A B C
2	D E F
3	G H I
4	J K L
5	M N O
6	P Q R
7	S T U
8	V W X
9	Y Z _
0	None
.	, ; :
-	+ * /

Appendix C

GC Parameters for the PREP_RUN Method

Setup Parameters

Screen Navigation Pathway	**Parameter – Value**
Status/Setup	Column Compensation - None
Status/Setup/Inlet Setup	Carrier Gas - He Units - kPa Adjustments - Vacuum Correct
Status/Setup/Oven Setup	Equil Time - 0.0 min Max Temp - 320° C
Status/Setup/Column Setup	Source Connection - Inlet Outlet Connection - Detector
Status/Setup/Column Setup/More/Configure Column (press Enter key)	Length - 30 m ID - 250 μm Film - 0.25 μm Press OK (F6) to accept these values
Status/Setup/Column Setup/More/Configure Mode (press Enter key)	Column Mode - Constant Flow Press OK (F6) to accept these values
Status/Setup/Automation	Valve 1 - none Valve 2 - none
Status/Setup/Automation/Auto Prep Run	Disable (DO NOT click enable)
Status/Setup/Configure/Clock Set	Set Date and Time Press Done (F6) to accept these values

Settings Parameters

Screen Navigation Pathway	**Parameter – Value**
Status/Settings/Inlet/More/Inlet Mode (press Enter key)	Mode - Split Press OK (F6) to accept this mode
Status/Settings/Inlet/More/Pulse Mode (press Enter key)	Mode - Normal Press OK (F6) to accept this mode
Status/Settings/Inlet/More/Gas Saver (press Enter key)	Mode - Gas Saver Gas Saver - 20 mL/min Gas Saver - 3.0 min Press OK (F6) to accept these values
Status/Settings/Inlet	Temp - 300° C Ratio - 200 Column - 5 mL/m
Status/Settings/Oven	Initial temp - 40° C Initial time - 1.0 min Rate - 5° C/min Final temp - 280° C Final time - 71 min Post-run temp - 35° C
Status/Settings/Detector	Mass Selective Detector Transfer Line - OFF, Heater Missing
Status/Settings/Auxiliary	Auxiliary type - No Auxiliary

Automation Parameters

Screen Navigation Pathway	Parameter – Value
Status/Automation	Sequence type - none

Saving the Method

Screen Navigation Pathway	**Parameter – Value**
Status/Method Files	Verify that method parameters are correct
Status/Method Files/Save (F8)	Save method as PREP_RUN

Appendix D

GC Parameters for the OFN_SN Method

Setup Parameters

Screen Navigation Pathway	**Parameter – Value**
Status/Setup	Column Compensation - None
Status/Setup/Inlet Setup	Carrier Gas - He Units - kPAa Adjustments - Vacuum Correct
Status/Setup/Oven Setup	Equil Time - 0.0 min Max Temp - 320° C
Status/Setup/Column Setup	Source Connection - Inlet Outlet Connection - Detector
Status/Setup/Column Setup/More/ Configure Column (press Enter key)	Length - 30 m ID - 250 μm Film - 0.25 μm Press OK (F6) to accept these values
Status/Setup/Column Setup/More/ Configure Mode (press Enter key)	Column Mode - Constant Flow Press OK (F6) to accept these values
Status/Setup/Automation (MANUAL INJ)	Valve 1 - none Valve 2 - none
Status/Setup/Automation (AUTO INJ)	Injector turret Size - Diagram matches installed turret Valve 1 - none Valve 2 - none
Status/Setup/Automation/Injector (AUTO INJ)	Injector Fan - ON Syringe - 10 μL Wash Bottle - Use bottle A only
Status/Setup/Automation/Auto Prep Run	Disable (DO NOT click enable)
Status/Setup/Configure/Clock Set	Set Date and Time Press Done (F6) to accept these values

Settings Parameters

Screen Navigation Pathway	**Parameter – Value**
Status/Settings/Inlet/More/Inlet Mode (press Enter key)	Mode - Splitless (press Enter key) Splitless Purge Flow- 50 mL/min Splitless Purge Time - 1.50 min Press OK (F6) to accept this mode
Status/Settings/Inlet/More/Pulse Mode (press Enter key)	Mode - Pulsed (press Enter key) Pulse Pressure - 172 kPa Pulse Time - 1.50 min Press OK (F6) to accept this mode
Status/Settings/Inlet/More/Gas Saver (press Enter key)	Mode - Gas Saver Gas Saver - 20 mL/min Gas Saver - 3.0 min Press OK (F6) to accept these values
Status/Settings/Inlet	Temp - 250° C Column - 1.2 mL/m
Status/Settings/Oven	Initial temp - 50° C Initial time - 1.0 min Rate - 25° C/min Final temp - 200° C Final time - 0 min Post-run temp - 70° C
Status/Settings/Detector	Mass Selective Detector Transfer Line - 280° C
Status/Settings/Auxiliary	Auxiliary type - No Auxiliary

Automation Parameters

Using Manual Injection

Screen Navigation Pathway	Parameter – Value
Status/Automation	Sequence type - none

Using AutoInjector

Screen Navigation Pathway	Parameter – Value
Status/Automation	Sequence type - Injector (press Enter key) First Vial - 1 Last Vial - 1 # Inj per Vial - 1 Repeat Sequence - no repeat
Status/Automation/Injector	Plunger Pumps - 4 Sample size - 1.0 µL Viscosity Delay - 0 sec Slow Plunger - NOT ENABLED
Status/Automation/Injector/Washes	Sample Pre-Washes - 2 Solvent A Post-Washes - 4
Status/Automation/Injector/Depth Offset	Enable Offset - DO NOT ENABLE
Status/Automation/Injector/Dwell Times	Pre-dwell - 0 min Post-Dwell - 0 min

Saving the Method

Screen Navigation Pathway	Parameter – Value
Status/Method Files	Verify that method parameters are correct
Status/Method Files/Save (F8)	Save method as OFN_SN

Safety Information – *Continued*

Electrical Safety

WARNING
Connecting the system to power sources that are not equipped with protective earth contacts creates a shock hazard for the operator and can damage the instruments.

Interrupting the protective conductor inside or outside the system or disconnecting the protective earth terminal creates a shock hazard for the operator and can damage the instruments.

Make sure the power cords supplied with the system are appropriate for your country and site before using them. Maintain easy access to the power cords so they can be disconnected during maintenance.

WARNING
The use of incorrect or makeshift fuses or the short-circuiting of fuse holders creates a shock hazard for the operator and can damage the instrument. Replace fuses only with fuses of identical current rating and type.

WARNING
Dangerous voltages are present inside the system even if the power switches are off. Turn off the system power switches and disconnect the system power cords from their outlets before removing any covers unless you are specifically instructed to do otherwise by this manual.

WARNING
Excessive fluctuations in the line voltage can create a shock hazard and can damage the instrument. Make sure the supply voltage does not fluctuate more than +5% or -10% from the rated voltage. This equipment must be installed in a Category II environment as defined in IEC664.

Thermal Safety

WARNING
Many parts of the system operate at dangerously high temperatures. Make sure the system is off and these parts are cool before removing any covers unless you are specifically instructed to do otherwise by this manual.

Chemical Safety

WARNING
The foreline pump exhaust and split vent exhaust will contain traces of the chemicals you are analyzing. These could potentially be toxic. Vent the foreline pump exhaust and split vent exhaust outside your laboratory or into a fume hood. Be sure to comply with all local environmental regulations.

Hydrogen carrier gas is extremely flammable. Explosions can result if hydrogen is allowed to build up in the MSD or GC oven. Study the Hydrogen Carrier Gas Safety Guide (Part No. 5955-5398) before operating the MSD with hydrogen carrier gas.

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